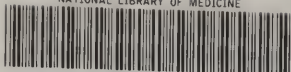


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The Shattuck Lecture

1891

NEURASTHENIA

AND ITS

MENTAL SYMPTOMS

By EDWARD COWLES, M.D., LL.D.

*Medical Superintendent of the McLean Asylum. Professor of Mental Diseases
Dartmouth Medical School; Clinical Instructor in Mental Diseases
Harvard Medical School; Fellow by Courtesy
Johns Hopkins University*

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SYNOPSIS.—Neurasthenia is one of the most frequent and important of nervous diseases, and its mental symptoms afford significant indications for diagnosis, prophylaxis and treatment. The history of the subject shows the early recognition of depression of feeling and weakened mental control, along with irritability, as signs of the characteristic nervous weakness. Insanity, in its functional and curable forms, is always weakness, and its study is useful in relation to neurasthenia, because they have a common etiology.

The animal organism is biologically a mechanism, made up of minor parts or mechanisms. Physiological activity always tends to fatigue, which may be local or general. The study of neurasthenia, or pathological fatigue, presents two essential considerations:

1. In normal fatigue, with the discharge of energy, the toxic products of exercise are always formed in nerve and muscle tissues. From this and other sources toxic elements may accumulate in the blood and tissues; in pathological fatigue these contribute to a local or general inanition and auto-intoxication. Visible changes in nerve cells, attending normal fatigue, go to support the inference of a molecular and chemical variation, in pathological fatigue, manifested as a condition of exhausted or changed nutritional power. These changes bear a direct relation to the etiology and pathology of neurasthenia; and habit, diathesis and idiosyncrasy have an important influence in causing "dispositions to repeat organic processes," both normal and abnormal. Physiological chemistry gives us some knowledge of the nature of autogenous toxic substance.

2. The study of the mental elements in normal and pathological fatigue shows that the mental symptoms furnish a ready index of the "fatigue":—(1) The emotional tone is either one of well-being or ill-being, and the latter, with mental depression, indicates changes in the "sense of body" or common sensations, due to deficient energy, inanition and auto-intoxication; (2) Special disorders of intellect and will are shown by a neurasthenic weakening of voluntary attention or the mental power of inhibitory control, and of memory, etc.

The analysis of normal and pathological fatigue shows that the mental symptoms of the latter may be readily recognized, that they correspond with the physical events in neurasthenia, and that all these phenomena, as far as they go, are in unity with the like conditions of melancholia.

The symptoms are objective and subjective,—mainly the latter,

which include the mental symptoms. These fall by analysis into four distinct groups relating to (1) mental depression and a sense of ill-being, (2) diminished power of voluntary attention and mental control, (3) introspection and worry, with attention acting in its attracted form, and (4) changes in the "sense of body,"—irritability and hyperæsthesia, languor and anæsthesia. Two consequent conditions become prominent, and are of the highest clinical importance:—morning tire, and anæsthesia of the sense of fatigue. The summary of symptoms leads to a definition, including both the physical and mental elements, as expressions of the inanition and auto-intoxication of pathological fatigue, viz.:—*neurasthenia is a morbid condition of the nervous system, and its underlying characteristics are excessive weakness, and irritability or languor, with mental depression and weakened attention.*

The diagnosis is made clearer by an analysis of the mental symptoms, which are true and sensitive indices of the lower physical changes. This aids in prophylaxis. Neurasthenia may be regarded as the initial term of many nervous disorders having a varied etiology.

The treatment with special reference to the objective symptoms, logically includes elimination, nutrition, rest, exercise, massage and promotion of sleep. The subjective, and especially the mental indications, being the earliest, and most significant from first to last, are the best guide to treatment; this must be suited to the two different stages of neurasthenia,—to the conditions of its *first-effects*, and its *after-effects*, and to different types of patients.

The plain philosophy of treatment is to recognize the mental symptoms as first showing the need of it, and to address it to the restoration of a healthy emotional tone as the central motive element; the lowering of this, and the weakening of attention and inhibitory control, are always the earliest signs of neurasthenia.

The maintenance of a normal sense of well-being is the sign of bodily health. Normal fatigue is simply wholesome tire; exercise should always be kept within the limits of *pathological* fatigue, in which the sensory over-tire, as fatigue-anæsthesia, marks the subtle beginning of danger. The natural safeguard is in the early recognition of the other mental effects of "fatigue."

These considerations go to prove the prime significance of the mental symptoms as a guide to the prophylaxis and treatment of neurasthenia.

NOTE.—This lecture will substantially form the third of a series of articles on "The Mechanism of Insanity" now being published in The American Journal of Insanity, and containing a more extended study of the mental elements also involved in this subject.

NEURASTHENIA AND ITS MENTAL SYMPTOMS.

MR. PRESIDENT AND FELLOWS

OF THE MASSACHUSETTS MEDICAL SOCIETY:—

THE founder of the Shattuck Lectureship, whose memory is revered for his good works, and his loyalty to medicine and the welfare of this Commonwealth, has provided for special attention to the study of "diseases of its inhabitants," or "such other subjects" as this Society may select. Your Committee, in appointing me to the responsible duty of fulfilling its trust, has done me a great honor; I wish to express my high appreciation of it, and of the privilege of now addressing you. With the foregoing indications as to my subject I find that in New England there is probably no disease more prevalent than neurasthenia. It was the thesis of Beard,—to whom the world so largely owes the formulation of the accepted ideas of nervous exhaustion under the name given to it by him,—that it was mainly an "American disease." He believed that the chief and primary cause of its development and increase was "modern civilization," and that it had its "rise and growth" and highest expression, in the Northern and Eastern parts of our country. For the present occasion we may be permitted to accept these views so far as to find in them a reason for the fitness of this subject, as having a special local interest in this State of Massachusetts.

The subject of this lecture has been chosen with reference to its practical importance for the general physician, whose usefulness so largely and exceptionally lies in preventive medicine. My observations in the treatment of insanity

have given me the conviction that in the commonly occurring and typical forms of mental disorder, which are of a functional and curable character, nervous exhaustion always plays an important part, both in the attending conditions and the causation. The treatment of these functional disorders, as far as the measures ordinarily regarded as therapeutic can go, is little else than the treatment of nervous exhaustion; this is the largest and most constant factor in producing the different groups of symptoms in disordered mental activity. Hence the practical usefulness of studying the varied manifestations of debility in nervous function, in its aspects prodromic to mental disturbance, both for the sake of cure of the existing disorder and for the prevention of the graver degree of exhaustion when insanity supervenes. Neurasthenia, according to Strümpell, is certainly one of the most frequent and important of nervous diseases.

History.—The subject to be discussed is neurasthenia, with special reference to the significance of its early mental symptoms as affording important indications for diagnosis and preventive treatment. When Beard, in 1868, described under the term neurasthenia a wide range of symptoms of "nervousness," or conditions of nervous exhaustion, he used the term as designating "a chronic functional disease of the nervous system, the basis of which is impoverishment of nervous tissue in excess of repair." When, in 1880 and 1881, he published in his latest works an elaboration of his well-known views, there had been a very general acceptance of the principles they involved; and subsequently many writers have classified neurasthenia as a neurosis, from its having no discoverable anatomical basis, and as signifying "nervous weakness." Beard's attempt to make of neurasthenia a distinct affection has however been much questioned. But by his originality and keenness of observation and analysis, he did his part in reducing a great array of data to definite principles, and initiating the wide

application that is now being made of them. In respect to their extension and particularly their relation to insanity, a statement here of the position held by the earlier writers will give the key to the present understanding of the subject.

The "deficiency of mental control," "inability to concentrate the intellect on any task," the rapid fatigue from "the exercise of concentration," the "mental irritability" and "hopelessness" were recognized by Beard as notable symptoms. He also observed the fact that "neurasthenia may concentrate itself almost exclusively on the brain—cerebrasthenia—with the symptoms of morbid fears and impulses, depression, insomnia, fulness, headache, impairment of memory, decline in mental force and power of control." But while making many such precise specifications of most characteristic symptoms of melancholia in its milder manifestations he would only admit that neurasthenia sometimes leads to insanity; and that, while many cases of nervous exhaustion, with irritability, great depression, etc., tending downward to melancholia, come to the border line, they do not cross it as a rule, though they may do so in extreme cases. Some cases of melancholia in our asylums, he says, have been neurasthenics, and some are saved from becoming insane; but he claimed neurasthenia to be a "distinct disease," not "exhibiting the enormous defect that is seen in insanity."

The universally accepted principles of the "rest treatment" that have become so well understood since Weir Mitchell's first recommendation of them, in 1875, in a regular and systematic scheme of treatment, need no discussion here. All are familiar with the classical description¹ of his cases of nervous exhaustion and his specification of the essential elements of the treatment:—seclusion, certain forms of diet, rest in bed, massage, and electricity. These

¹ *Fat and Blood*, 4th. Ed. 1885, pp. 38-43.

measures have stood the satisfactory test of experience by their use in proper cases, in promoting "a liberal gain in fat and blood," of which "the gradual increase will be a visible result of the multitudinous changes in digestive, assimilative, and secretive power in which the whole economy inevitably shares." The great importance of the mental element in neurasthenia, and the widening application of the principles and plan of treatment in mental disorders are in fulfilment of Mitchell's own prophetic words that its sphere of usefulness was likely to extend beyond the limits originally set by him. The bodily conditions in insanity were not fully recognized as so largely those of nervous exhaustion as they really are; and Mitchell, Goodell, Playfair and others have held like views on this point. Mitchell wrote, "The true melancholias, which are not merely depression of spirits from loss of all hope of relief, are best left alone as far as this treatment is concerned. The nutritive failures which so often accompany them must be met by other means than rest, seclusion, etc."; and this opinion was believed to be "sustained by some failures" on his part, and by the opinions of others.

It is interesting to note, however, how largely the plan of treatment was addressed to the mental condition of the patients:—the manner in which their confidence and co-operation was gained, and particularly the seclusion, were for their mental effect. The need to "rest the organs of mind" was noted, and that "it is thought with the friction of worry which injures, and unless we can secure an absence of this it is vain to hope for help by the method" described. It was Playfair's rule that the mode of treatment is "valueless without the cordial submissive assistance of the patient." But we have now been taught by experience the efficacy of these measures even when enforced, in the nervous exhaustion of melancholia and mania. All writers have observed, as did Mitchell, that "many neurasthenic people suffer from

any prolonged effort at attention,"—also the common loss of mental control. It is this characteristic lessening of the power of voluntary attention that becomes so significant in its diagnostic value, after we have observed its greater weakening in the graver exhaustion of melancholia. The common occurrence in the cases described of a brain hyperæsthesia¹ as mental irritability, the depression of feeling, and despondency, are equally significant and characteristic of mental disorder from nervous weakness.

Hereditary and Acquired Neurasthenia.—The fact of hereditary predisposition was observed by all writers. Beard characterized it as a congenital weak resistance of the nervous system, entailing neurasthenia as a disease, or as constituting a nervous diathesis upon which the disease would be developed under deficient nutrition. But the idea of it as a clinical entity to be differentiated from other nervous and mental disorders has been broadened by some who regard neurasthenia as the primary condition of all nervous degeneracy,—not as itself a neurosis or a psychosis, but as the soil from which these may grow. There are two great groups of these affections, the hereditary and acquired. When inherited there may be organic modifications, permanent embryonic conditions, of the central nervous system as found in idiocy, etc., according to Arndt; or there may simply be a neuropathic predisposition with organic changes as yet undiscoverable,—a constitutional weakness and instability of the nervous system,—and this is hereditary neurasthenia. The form of acquired neurasthenia may occur in the constitutionally strong, and both forms may be due to any nutritional or toxic causes that can initiate a condition of weakness and irritability of the nervous tissue. Upon such a basis of organic and neurasthenic weakness, there may be engendered not only nervous disorders in general, but processes of degeneracy; and there may be like disorders and degeneracy in respect of those nervous functions

which we call mental. All diseases being considered not as "entities," but as morbid conditions and processes of which we observe the "symptoms," we may regard neurasthenia as a disease either hereditary or acquired, and as manifested by many mental symptoms.

General Relation to Insanity.—The statement has already been made that in certain forms of insanity the bodily conditions are essentially those of nervous exhaustion. Of the great number of people, who are in neurasthenic conditions, it is true to say that only a certain proportion become insane. But conversely, the proposition may be equally true, that all people of previously sound health and constitutions, who become insane with ordinary functional mental disorders, have their psychoses dependent upon neurasthenic conditions of the organism, whether the nervous power is annulled quickly by shock, or enfeebled more slowly by prolonged stress or other weakening influences. The fundamental condition here is acquired neurasthenia. When it is hereditary there is a plainer dependence thereon of mental symptoms that come more readily in such cases from stress, nutritive failure, etc. Insanity is always weakness from some cause or other, and the group of symptoms in any given case is a matter of the kind and degree of nervous exhaustion. We find the mental symptoms of neurasthenia in insanity, but being emphasized in unequal degrees in the latter condition, their import is more clearly revealed. Thus we may learn from the study of insanity how to understand and treat the lesser manifestations of nervous exhaustion in its earliest stages, as they are commonly seen by the general physician. In the study of the mental conditions having a common etiology, it will be of advantage if in either case the source and genesis of the symptoms can be made clearer. The present endeavor is to make such a contribution to the subject from observations of mental disorders dependent upon neurasthenia. It will

first be necessary to consider some of the fundamental principles that must be regarded in the analysis and interpretation of the data of clinical observations.

The Animal Organism a Mechanism.—The animal organism is regarded biologically as a mechanism which is stimulated to action by its environment, and in turn, acts upon it. Underlying all these phenomena is reflex action of the nervous system, and physiologists generally agree to consider every action as aroused by some definite cause or stimulus.¹ The mechanism, as a whole, is regarded as made up of minor mechanisms, when studied by the physiological method which reasons from structure to functional activity, and from activity back to structure. But the physiologist must observe many "activities" for which he can, as yet, only infer corresponding elementary parts in the organism, the relations of which he can only study as they are represented by their activities. This is peculiarly true of the mental mechanism and its activities, such as attention and memory. We have to assume that every manifestation of mind is correlated to a definite mode and sphere of brain activity; and we can conceive it as constituting a mental mechanism. We can conceive also all the systems and organs of the body as so many co-ordinated mechanisms,—as the muscular, circulatory, and digestive mechanism, etc. The nervous system as a mechanism, made up of many local adaptations to structure and function, presents a like variety of minor mechanisms, with peripheral and central elements of co-ordinated ganglia, nerve-fibres, and nerve-endings. Any one of these minor nervous mechanisms may become neurasthenic from excessive or irregular exercise of its functional activity; the end-organs of the special senses, and any part of the peripheral or central sensory apparatus may become separately fatigued,—allowance being made for the resistance to fatigue of conducting nerve fibres.²

¹ Sedgwick. Art. Reflex Actions, Ref. Hand Book of Med. Sciences.

² Bowditch. Jour. of Physiol., Vol. 6, p. 133.

The same is true of the nervous elements of the motor mechanisms. All the inhibitory mechanisms, and particularly, in the sympathetic system, neurasthenic conditions of the inhibitory vaso-motor centres are especially important in the causation of both local and general disorders. The metabolic processes in general may suffer from central weakness of innervation and control; and there may be neurasthenia of such special organs as the heart, stomach, and liver. Thus there are many forms and degrees of the phenomena of nervous exhaustion classified under the divisions of cerebral, spinal, or general neurasthenia; and hence neurasthenia has been defined by Ziemssen¹ as "a functional weakness of the nervous system, varying from the slightest degree in single localities to entire loss of strength in the whole nervous system." But though the symptoms vary greatly according to the functions of the part affected, we are always led back to one principle:—the weakness of the nervous system from some cause, whatever it may be.

The physiological basis of these phenomena is the principle of the storage and discharge of energy of muscle and nerve. This accords with the biological theory that all function is due to chemical changes taking place within the organism, and that the functional activity of a specialized tissue depends primarily upon these changes in the individual cells. The fundamental idea is, that in the resting state the cell elaborates highly complex compounds, and that these break down to yield the energy by which the cell does its work.

Importance of Physiology and Chemistry.—Such being the character of the organic mechanism the difficulties have been very great in gaining an understanding of these affections. Writers have dwelt chiefly upon the facts, clinically observed, of the expenditure of nerve force and "the waste

¹ Neurasthenia. Wood's Monographs, Vol. 1, 1889, p. 534.

of nerve-tissue in excess of repair"; and emphasis has been laid mainly upon the nutritional elements of the problem. But while they have recognized the necessity of treating the mental conditions upon which they made clinical observations, the larger import of these mental symptoms has escaped full appreciation. Moreover, in the search for lesions explanatory of the most marked disturbances of function, anatomy and pathology are as yet disappointing. Physiology offers greater aid, and by the new laboratory methods not only bodily but mental activities may be studied, in advance of our knowledge of the structural mechanisms upon which they depend. Now newest of all, comes the science of bacteriology with its wonderful revelations, and the new discoveries in organic and physiological chemistry; they promise to throw great light upon these mysteries of our problem.

Two essential Considerations.—The present status of this problem gives us two important indications:—first, we cannot correctly conceive the existence of a condition that may be called "pure neurasthenia" as a matter of simple weakness from over-use, and inadequate rest and nutrition, but we must make large account of the presence of toxic materials in the tissues as the immediate products of this normal exercise;—and second, we must take into account also the nature and manner of production of the mental symptoms common to neurasthenia and insanity, and their significance and value must be better understood and appreciated. There is time here for only the briefest mention of some of the conclusions reached by the newer investigations in the different branches of this complicated problem; these may serve to indicate the grounds of the arguments in support of the two foregoing propositions.

1. *Toxic Elements in Normal and Pathological Fatigue.*—The normal organic mechanism, represented by a healthy adult, may be taken as a standard for observation.

When it is stimulated to activity there may be observed the phenomena of use, and of stress from over exercise. Beginning with the peripheral muscular mechanism, physiology teaches us that fatigue is not the only result of muscular contraction. Noxious products are always yielded as the results of the attendant chemical change in the muscle-substance, by the decomposition of certain parts of which, the latent energy is set free and expended in mechanical work. The restoration to the normal state is not alone through rest, and processes of repair by nutrition and the rebuilding of the complex molecular substances of the muscular tissue, but the blood current carries off the immediate waste products, obstructive to function, while it brings new raw material.¹

Normal Fatigue.—A muscle made to contract repeatedly, whether by electrical stimulation or voluntary effort, will yield regularly lessening contractions until it ceases to respond and is said to be "exhausted." In the case of voluntary contractions there is central fatigue also from the expenditure of energy in mental effort. The difficulty has been to distinguish between the central nervous fatigue, and the peripheral fatigue of muscles; but Mosso,² Maggiora,³ Lombard,⁴ and others have shown that the "curve of fatigue" is alike in each case. They have demonstrated experimentally in man, that there is an intimate connection between the fatigue of the central nervous system and that of the muscles,—that there is loss of power by exercise in both peripheral and central mechanisms,—and that the effects in each may be studied separately. When certain muscles were experimentally fatigued by long continued work under both electrical and voluntary stimuli, it was found that other muscles not exercised were also affected and their

¹ Foster. Physiology, 5th Eng. Ed. 1890, pp. 148-152.

² Arch. Ital. de Biol., 1890, pp. 123-186. ³ Ibid. pp. 187-241. See review of both articles Amer. Jour. Psychol., Vol. III. pp. 377-381.

⁴ Amer. Jour. Psychol., Ibid. p. 24.

power lessened, as by a transmitted toxic influence. It was found also that human muscles have an excitability and energy peculiar to themselves, and that they weary independently of the excitability and energy of the nerve-centres. This shows that the muscles are the seat of certain phenomena of fatigue which, thus far, have been thought to arise in the central nervous system and to belong essentially to it. Under prolonged exercise there is lessened sensitiveness as well as diminished power.

In a man subjected to severe mental work, it was found that the muscles, which had been inactive, were weakened by it. The result of such experiments is regarded as going to show that a poisonous material, produced by chemical changes in the brain, enters the circulation, and, acting upon the muscles, weakens them. These demonstrations are also in accordance with the generally accepted physiological principle that the central nervous mechanisms, as do the muscular, undergo a regressive metabolism of tissue upon exercise, and that this is also of an oxidative character with toxic waste products.¹ There is also in nervous centres a like loss of normal excitability with fatigue and exhaustion.

Physiological Shrinkage and Recovery of Cell-contents.—A further demonstration of the physiological changes in nerve-cells is being made by Hodge,² in his experiments begun in 1887, which are of the most significant interest. The electrical stimulation, in frogs and cats, of a nerve going to a spinal ganglion caused, after a number of hours, a marked shrinkage of the nerve-cells, particularly of the nuclei, which lost forty per cent. of their bulk; the cells themselves, though decreased but little in size, showed extreme vacuolation in the cell protoplasm; and the nuclei of the cell capsule shrunk to a noticeable degree. The

¹ Foster. Op. cit., p. 154.

² Am. Jour. of Psychol., May, 1888; May, 1889, and Feb., 1891.

change in the cells was found to be generally in proportion to the severity and duration of their stimulation. It was shown that in a subsequent resting state the cells recover their normal appearance, but by a slow process. After five hours of severe work and a shrinkage of 48.8 per cent. in the nucleus, recovery required twenty-four hours. In the cells of a worked ganglion there are different degrees of shrinkage of the nuclei,—from 5 to 80 per cent. of original volume; in the latter the protoplasm was riddled with vacuoles and the nucleus shrunken to a densely staining speck. The spinal ganglia of pigeons and English sparrows, after normal exercise, showed exactly similar changes;—the difference between the condition of the sparrows' cells, when rested in the morning, and fatigued at night, being much more marked, on some occasions, than could be obtained by the most severe electrical stimulation. Sadowski has obtained the organic changes, of neurotic coagulation and vacuoles in central cells, from peripheral stimulation, mechanical and electrical. There can be no doubt that such visible changes are accompanied by chemical reactions also; the worked cells took the staining differently, and it is probable that new granules were formed taking a darker staining. The evidence is important, that all these changes are normal, and correspond with the daily rhythm of rest and activity,—sleep and waking.

These physiological and chemical explanations of the conditions following exercise, are supported by an evident diminution and removal of the substance of the nerve-cells as a normal process. It is shown that the actual expenditure of energy, muscular or nervous, is a factor which has always joined to it a toxic element in the products of the changes normally caused in the tissues by functional activity. There may be local areas of toxic influences hindering or inhibiting the functions of distinct peripheral or central mechanisms; and the blood becoming charged with them more general effects may be produced.

These are the common phenomena of a normal active life, in the daily round, from morning rest, vigor and alertness, to evening fatigue, weakness and heaviness,—both in mind and body. The restoration of normal conditions, with the re-storage of energy, comes through nutrition, furnishing new raw material,—rest, to stop the expenditure of energy and give time for the chemical building up of cell-contents, as well as for the removal of accumulated waste products,—and sleep, to hold in abeyance the general normal irritability, and afford effective repose to all tissues whose activities can be spared from the vegetative life. Unused muscle wastes; when used it grows. The nutrition of a muscle is favorably affected by its functional activity.¹ A wholesome degree of fatigue is normally attendant upon physiological use, through increased blood-supply and re-actions promotive of nutrition; this may be characterized as normal fatigue in contradistinction to the more pronounced effects which constitute exhaustion.

Pathological Fatigue.—In contrast with these normal processes may be placed the picture of the unbalanced conditions of waste and repair,—of expenditure and storage of energy,—the conditions of pathological fatigue, or neurasthenia. In a recent paper, valuable for its concise analysis of the subject, Dana² has given a comprehensive definition. He says, "Neurasthenia is a morbid condition of the nervous system whose underlying characteristics are excessive irritability and weakness"; it is "a condition in which the nutrition of the nerve-cells is primarily at fault." Can these phenomena be accounted for in default of anatomical and pathological findings? •

It has been shown how inseparably normal fatigue from the discharge of tissue energy is accompanied by toxic products that increase the fatigue. Now every action of the

¹ Foster. Op. cit. p. 146.

² Art. Neurasthenia. The Post-Graduate, January, 1891.

mechanism is considered as aroused by some definite cause or stimulus. Stimulation too soon repeated, without giving time for rest and repair, finds nerve-cells in fatigued areas, having less power to act because of inanition from deficient rest and nourishment; they are also hindered in action by the incomplete removal of the toxic products of previous action,—in other words, there is inanition and auto-intoxication. Then further assimilation is hindered,—first by the lessened nutritive quality of the blood from non-eliminated toxic materials,—and second, by the probable toxic weakening of the cells' power to assimilate the nutrition that is furnished them. The development of a manifestly morbid condition may be very slow and insidious, or more rapid according as the balance of the processes of constructive and regressive metabolism is more or less on the side of weakness, exhaustion and impoverishment. In explaining the effect of this gradually failing elimination of the products of metamorphosis, acting as an irritating and exciting intoxication, Kowalewsky¹ says, "there will then be a condition of partial inanition of the exhausted portion of the central nervous system, while, in the same part, partial auto-intoxication is going on, and while the remainder of the organism is in its normal condition. The result of a partial inanition will be an increased excitability on the one side, and, on the other, a quick exhaustion of the nervous system; these are the constant characteristics of neurasthenia. Thus a locally limited over-strain of a certain part of the nervous system may lead to exhaustion and neurasthenia."

It has been easy to understand how the "nervous weakness" so essentially characteristic of neurasthenia, should be a logical result of "exhaustion" by over-use; here is not only further explanation of this, but the "excessive irritability" is accounted for; tissues, weak from partial inanition, and, under constant stimulation from toxic irri-

¹ Centralblatt f. Nervenheilkunde, October, 1890.

tation, almost excited into action, are over-sensitive upon the addition of ordinary stimuli. It is a kind of "hair trigger" sensitiveness that amounts to hyperæsthesia.

The localized neurasthenic conditions being acquired in this way in an organism previously healthy, it is easy to see how "entire loss of strength in the whole nervous system" may come about, through its prolonged exercise without due intervals of rest. In the excess of nervous activity and of the metabolic processes, there appears to arise from the decomposition or "combustion" of tissues, a condition of general inanition from inability of nerve-cells to take up the nutriment and oxygen presented to them in the circulation. Kowalewsky describes this as a demand for oxygen in the whole organism, or oxygen-hunger. This tends to increase, by deprivation, the partial and local inanition; and obviously the blood may be charged with an excess of the products of regressive metamorphosis, through inefficiency of the eliminative processes,—often because of weakened innervation. Then, he says, there is general auto-intoxication which adds its influence to the limited and local neurasthenic condition that may have been previously established. From this reasoning we derive four principal factors that, as pathological conditions, operate in presenting the phenomena of neurasthenia, and make up its clinical picture:—

1. Partial (local) inanition.
2. Partial (local) auto-intoxication.
3. General inanition.
4. General auto-intoxication.

This leads to the conclusion that, in very many cases certainly, neurasthenia has its foundation amply accounted for. The condition of inanition and auto-intoxication, whether partial or general, may vary according to the presence of one or more of the factors and their different values in the particular case. The auto-intoxication will

affect one mechanism, or organ, differently from another, according to the dissimilarity of structure and function; from different organs, or tissues, will come different kinds of toxic products, and their effect will vary also according to their amount. In anæmia, the general impoverishment of the blood, from its own diseases, will of course contribute to, and may initiate, both local and general neurasthenic conditions. Even when the blood supply is ample there may be locally limited over-strain and nervous exhaustion, probably due in part to the inability to assimilate nutrition. The conclusion of this matter is that, in morbid conditions, nervous weakness from inanition, due to expended energy and lack of nutrition of the nervous system, has always joined to it the varied effects of auto-intoxication as a dual cause of neurasthenia.

The Etiology of Neurasthenia,—Primary, Secondary and Hereditary.—The genesis of acquired neurasthenia in a healthy organism can thus probably be largely accounted for as a primary neurosis due to the immediate effects of over-strain, or a primary and toxic disorder of nutritional functions. The principle may be equally well applied to the secondary neurasthenias,—those consequent upon other diseases, each with its peculiar exhausting and toxic influences, as the essential feature of a general pathological diathesis. It is as yet impossible to say what the chemical action in cell-protoplasm may be that causes the increased excitability and quicker exhaustion of nerve tissue, when they are consequent upon the chronic auto-intoxication of rheumatic and gouty diathesis; but the transmission of these diatheses by heredity we cannot doubt, nor that children inherit neuropathic and neurasthenic predispositions from rheumatic and gouty parents. The same is true of all the "constitutional" diseases. The transmission of the effects of nervous diseases, alcoholism, syphilis, etc., may sometimes be shown in structural changes and

defects of the central nervous system,—sometimes, according to Arndt,¹ in permanent embryonic conditions from arrested development, but slightly demonstrable, and constituting the structural basis of hereditary neurasthenia. While this term may still be fittingly applied to those cases where there is only a predisposition to functional disturbances and disease of the nervous system, the close relationship of all these conditions to organic changes is apparent.

James Putnam,² in his study of the etiology of sclerosis of the spinal cord, notes the predisposition by neuropathic inheritance to degenerative change,—the suggestion, by some pathological findings, of a strain of constitutional or developmental weakness,—the general enfeeblement of the whole body through debilitating influences, as probably initial to a primary degeneration becoming relatively chronic,—the increasing importance assumed by toxic influences like syphilis, lead, arsenic, etc., and their conjunction with conditions of simple impairment of nutrition as contributive,—the influence of over-exertion with stimulation and sensory irritation inducing ganglionic exhaustion to a pathological degree,—and the possible relation of acute to chronic local anæmia.

According to Klebs,³ also, the most essential characteristic of all degeneration is the deposit in the tissue of substance derived from nutritive changes in the part. There are disturbances of assimilation caused either by the deposition of non-assimilable material or by a diminution of the power of assimilation of the tissue; and the material may originate in the part or be brought to it from without. As an example of this, fatty degeneration is one of the most frequent and important pathological conditions which occurs in conjunction with the protoplasmic structures and the deterioration

¹ Die Neurasthenie, 1885, p. 110.

² Jour. of Nerv. and Ment. Diseases, Feb. 1891.

³ Die Allgem. Pathol. II., pp. 54, 67 and 281, 286.

of their functions. General fatty degenerations always arise from influences which are either of an infectious or toxic nature.

As to the processes of pure, real atrophy, Klebs says, we have to deal with two fundamentally different sorts of disturbances of nutrition, according as the necessary food is withheld from the parts, or the power to assimilate it is lessened. In the central nervous system, the frequency and significance of circulatory disturbance depend on the easy disturbance of the nervous elements in consequence of the withdrawal of nutrition. The mental functions may be greatly disturbed by even simple anæmias if continued a certain length of time. Probably material changes in the composition of the blood may aid in affording the local anæmia the time necessary for bringing about the process of atrophy. In favor of this is the connection of many acute mental disturbances with infectious diseases, and their occurrence after typhus, puerperal fever, and acute articular rheumatism.

Pathology of Neurasthenia.—These pathological considerations indicate the effects that may follow from such initial causes as cerebral fatigue, toxic influences, lessened power of assimilation, local anæmias, etc., in the easily disturbed nervous elements. As the greater includes the less, we must regard the initial functional weakness and irritability of acquired neurasthenia, proceeding from the same causes, as their milder manifestations. Inasmuch as the "constitutional" taint or diathesis may be transmitted, we know not how, certain conditions in the individual may be regarded as consequent upon it and consistent with clinical observations. It is conceivable that the inheritance includes no more than "a molecular or chemical variation" in the central nervous system as the essential basis of the predisposition in hereditary neurasthenia. This implies "an exhausted or changed nutritional power"¹ and it may affect

¹ Kowalewsky, loc. cit.

any special system or organ, as the central nervous system, liver or kidneys.

The foregoing considerations lead to a more precise conception of neurasthenia as a pathological condition, which may be the outcome of normal activities of the organic mechanism simply carried to excess, and conceivable as a subtle, and perhaps but slight, departure from a normal state. The restoration of cell contents to a normal state, following the physical changes observed by Hodge in normal fatigue, might continuously fail of being quite complete; and the "molecular or chemical variation" would then become established as the condition of "exhausted or changed nutritional power."

Habit, Diathesis and Idiosyncrasy.—There are other considerations, relating to the effects observed as accompanying the physiological use of the bodily mechanism, that are of great importance here. They include as an active factor, constantly and profoundly influencing all the activities of the mechanism, the law of use and practice, constituting the law of habit; they also include diathesis and idiosyncrasy. These modifying factors, or conditions, are nearly allied and are not always discriminated.

In regard to the law of habit, the moment the organic mechanism is put in use the effect of the law may be observed. In the reflex action of the organism it is a familiar fact that nervous action tends to follow certain lines of conduction, along sensory and motor nerves, and through transforming centres traversed before under like conditions; this constitutes the "nervous circle," and suggests the analogy of "paths" in the nervous mechanism. The well known effect of practice in the muscular mechanism conforms to the law of use; and it must be taken for granted that analogous processes of practice take place everywhere in the nervous system and its accessory organs.

After any nervous action a changed condition remains by

which a repetition of the action is rendered easier, and in all processes dependent upon the nervous system there are after-effects which find their expression in what is called "practice."¹ According to Wundt, the molecular changes in which this practice consists being unknown, it still claims material after-effects, which continue at first, but with no practice gradually fall away, and do not consist in a continuation of the function itself, but in facilitating its repetition; the remaining molecular effects are to be thought of as functional dispositions. This functional disposition to repeat organic processes constitutes the law of habit.²

The disposition must then be considered as consisting in a tendency of cell-contents to repeat the physical and chemical changes that occurred before, upon a repetition of the given stimulation. Thus use and practice are fundamental to the law of habit, and the conception of the "path of practice" in the nervous system implies ultimately the disposition of cells and cell-contents to repeat their processes in such a way as to constitute a habit; and through the effect of habit, there come to be paths of least resistance for the discharge of energy of nerve-cells.

The law of sensory and motor habit, in the lower centres of the mechanism, has a strictly physiological basis, and the process is a physiological one by which these neural habits are acquired, from the beginnings with the labored first efforts to the facility of the most automatic of reflex actions. As already stated a nerve-cell, or group of cells, receiving an impression is modified in some way, and retains an aptitude or disposition for reacting again in the same way. This being true, the same law applies to all the co-ordinations of centres, as groups of cells, which acquire dispositions to act together; whatever be their functions, they become associated in action, and the law of association is an

¹ See Radestock, *Habit*, trans. pp. 15-16.

² For further discussion of this subject see my article, "The Mechanism of Insanity." *Am. Jour. of Insanity*, April, 1891, p. 475.

extension of the law of habit that governs all neural activities. There is abundant evidence of such physiological association, not only between neural and muscular activities but between these and mental processes. This is true whether these processes are simply physiological and normal, or pathological in their nature. The effects of the laws of habit and association are most significant as to the evidence that during the acute stages of nervous and mental disorders, accidental changes in the play of nutrition, exhaustion, and toxic inhibition, disturb the wonted channels of nervous activity, and the currents may be arrested or diverted into new created paths. Such variations of molecular activity acquired by habit, also tend to remain as "after-effects" when the causes have passed away. The readiness with which such morbid neural habits may be acquired, and how intimate are the relations of mind and body in their influence upon each other, have been well shown by Tuke,¹ and by Weir Mitchell's descriptions of the mimicry of disease.² Prince³ has also shown how these laws of habit and association should be extended, in his study of "associated neuroses and psychoses," in hysteria, neurasthenia, etc.

For these reasons the consideration of the constant influence of these laws of use, practice, habit and association, should never be overlooked in the study of these disorders of physiological processes. The operation of these laws, when long continued, aids in inducing and perpetuating the changes, or "after-effects," which are conceived as something more than "dispositions" and not yet pathological, but as contributory and initial to such conditions and acting as "predispositions."

In normal conditions, native tendencies may become established in the individual, by "education" of the nervous system through the operation of these laws. These are

¹ *Influence of the Mind upon the Body*, 1884, 2d ed.

² *Nervous Diseases*, p. 50, et seq.

³ *Jour. Nerv. and Ment. Dis.*, May, 1891.

fundamental also to the theory of localization of cerebral functions, as the specialization of function of certain centres. The remarkable fact of the restitution of function after cortical injuries affords reason for believing that there is the formation of new paths in the remaining centres, by which they become "educated" to duties which they did not originally possess.¹

The central and peripheral mechanisms are therefore to be regarded as alike having specific functions, both native and acquired, both being manifestations of the law of habit and the important principle that our nervous system, in its elementary parts, becomes educated to such specific functions. The study of the law of specific nerve energy, and its relations to the law of practice and habit, furnishes further important evidence, not only of the plastic and changing character of our organic mechanism when put in use, but of the fixedness given by habit to modes of action long in use, alike in health and disease. This reveals the potent influence of habit in all organic activities, whether physiological or pathological.

Native tendencies when acquired and established may come to be transmitted, appearing as a part of the hereditary endowment; then there is a significant analogy between them and the recognized morbid "predispositions" which must have been largely acquired through the same laws. It is well, therefore, in seeking for the pathology of neurasthenia, to take account of habit as an element both of neural conditions and predispositions. The force of habit tends to establish disordered activities by the direct operation of the law of practice in the irregular action. In the evil effects of "disuse," and the consequent loss of power, there is probably never complete disuse, and the effects of vicious and deficient practice are manifestations of the primary law of use. The recovery from chronic invalidism, through re-

¹ James. Psychology, Vol. I., pp. 24-30.

sumption of right practice, finds sometimes striking examples, as in "mind-cure," hypnotism, etc. These laws of use, practice, habit, and association in physiological processes, also help to an explanation of the clinical phenomena of apparent resistance to nutrition in confirmed neurasthenia. They cannot be ignored as contributive, and they are, perhaps, sometimes the sole cause of the underlying molecular variations in the nerve-cells, whose exhausted and changed nutritional power is thus maintained.

The relations of the diatheses to neurasthenia have been noted; great interest also attaches to the study of the more defined and limited tendencies known as idiosyncrasies,¹ which are innumerable in variety; everybody has them, and they are but rarely discriminated unless made prominent by their singularity and inconvenience. The well-known forms of idiosyncrasies against certain drugs, articles of food, poisons, etc., commonly regarded as constitutional and hereditary, are known to be sometimes suddenly acquired,² when there had been previous toleration, for example, in the use of chloral, quinine, tea, tobacco, etc. The changes in the organism induced by drug habits are of equal interest.

The relations of all these phenomena to molecular and chemical variations finds explanation in the newer views as to the physics and chemistry of cell activity. It is probably not too broad a conception of the law of habit to regard it as capable of inducing, in this way, and certainly as contributory to, both diatheses and idiosyncrasies. The views generally held of these conditions or results of activity lead us to regard them as representing tendencies to structural change. Habit, diathesis, and idiosyncrasy, may be characterized as principal elements of variation in the organic mechanism. In the direction of pathological change they describe conditions initial and antecedent to it, being them-

¹ See Hutchinson, *Pedigree of Disease*, 1884.

² Field. *Art. Six Generic Drug Modifications*. *Boston Med. and Surg. Jour.*, June 26 and July 3, 1884.

selves not structurally demonstrable, except as to some congenital peculiarities classed as idiosyncrasies. Habit, though primarily normal, must, as a functional *disposition* to repeat organic processes, increase the persistency of the other two conditions. Diathesis is regarded as having always a pathological interpretation and as being a *proclivity*¹ to some peculiar type of disease; it is both hereditary and acquired, and carries the idea of persistency,—but it is curable, and having a toxic element conforms to the conception of a molecular and chemical variation. Idiosyncrasy is assumed to depend upon some structural change, usually hereditary and not always tending to disease. But being sometimes acquired, and often existing as a susceptibility to toxic influences, this implies again the occurrence of variations, of the character already mentioned, that may be initial to pathological change. And these implied variations serve to account for the manifestations of an exhausted or changed nutritional power.

While our present knowledge of the pathological conditions in neurasthenia is unsatisfactory, even with the most logical of inferences, we have to study, with all the more care, the recognized influences at work in the genesis of this nervous disorder. In the study of neurasthenia it is of special importance to note that such individual tendencies and idiosyncrasies may become emphasized with the lowered tone of the nervous system, and increased susceptibility to toxic influences.

Classification.—In its acquired form, in a previously healthy organism, it is a primary or a secondary neurosis,—primary when it is due to the immediate effects of nervous over-strain, or to a primary and toxic disorder of nutritional processes,—and secondary, when consequent upon other diseases having a general pathological diathesis with its peculiar exhausting and toxic influences. There is an acute

¹ Hutchinson, op. cit.

stage, in which the double elements of causation are always present: exhaustion with inanition, and toxicity. It is important to remember that the acute stage may continue for years with a series of exacerbations, under recurrences of the dual causes, and the tendency of nature to effect recovery, which may be finally established. In the chronic stage there has supervened the "molecular or chemical variation" manifested as "an exhausted or changed nutritional power" in nerve-cells,—a condition which may sometimes represent a partial recovery. There may be, in this stage, good blood, good muscles, a well-working mechanism, fairly good health, and physical comfort within lessened limits of nervous strength. The word chronic implies more than duration,—the transition is complete to the stage of permanent change, and the "constitutional predisposition" is fully acquired and established. It is this predisposition transmitted, which constitutes hereditary neurasthenia. In this condition all the forms may occur in all degrees of severity, and may be ameliorated by prophylaxis; it may even exist so quiescent and concealed that it appears to have acute and active manifestations followed by recovery.

Autogenous Toxic Substances.—In support of these conclusions, there would seem to be no unreasonable stretch of inference in such an analysis of the well-known facts of the autogenous production of toxic substances, and of their action in the causation of neurasthenia. Moreover, these facts, and much past conjecture, are now being reduced to scientific order by the discoveries that have established the principle of autogenous disease. It is shown that as the poisons of infectious disease are the chemical products of the action of bacteria upon organic matter, so there are like poisonous substances that regularly result from the chemical changes in non-infectious tissue-metabolism within the body. Just as ptomaines are noxious to the micro-organisms pro-

ducing them, so are the normal cells injured when the products of their own activity accumulate about them. The discovery, in some of these animal alkaloids (ptomaines and leucomaines), of the chemical poisons that have long been sought, is of special interest in the study of neurasthenia. Some of the substances, not alkaloids, formed in the alimentary canal in the processes of digestion, are powerful poisons,—the albumoses and peptones normally produced in the breaking up of the proteids in the food. As Vaughan¹ states it, in discussing the chemical factors in the causation of disease, "it matters not whether the proteid molecule be broken up by organized ferments (bacteria), or by the unorganized ferments of the digestive juices,—by the cells of the liver, or by those still unknown agencies which induce metabolic changes in all the tissues,—in all cases poisons may be formed. These poisons will differ in quality and quantity according to the force which acts." A number of observers have shown that the peptones may have an intensely toxic action, should they reach the general circulation unchanged.

Hare² explains the symptoms of biliousness as not depending upon the changes in the bile, but upon failure of proper digestion in the stomach and intestine, coupled with the development of irritative decomposition-products including a large number of poisonous alkaloids. Normally these do not form in the presence of the antiseptic bile which counteracts the action of the bacteria introduced with the food and is always to be found in the intestinal canal. The disorder of the hepatic function of destroying all poisons of an organic character permits the entrance into the general circulation of these substances, some of which act as do curare, digitalis, atropine, muscarine and picrotoxine; and the number of these compounds is indefinite. He suggests

¹ Jour. Am. Med. Assoc., May 16, 1891, p. 16.

² Practical Therapeutics, 1890, p. 357.

that when symptoms of such poisoning appear, relief may be afforded by the known antidotes for those drugs.

Brunton¹ describes some symptoms of dyspepsia, generally occurring about two hours after meals, as resembling curare-poisoning of the peripheral ends of the motor nerves. There are "muscular relaxation," "a curious weight in the legs and arms" which "feel heavy like lumps of lead." He says that the "melancholy and depression of spirits," associated with disorder of the liver, depend upon noxious substances passing into the general circulation because the liver fails to arrest them. He notes the "hypochondriasis and depression of spirits" associated with oxaluria, when "the patients complain of incapability of exerting themselves, the slightest exertion bringing on fatigue." Severer cases in the asylums have been described as the insanity of oxaluria. But Brunton says these symptoms may occur without oxaluria, and he conjectures the presence of some poison in the blood.

Halliburton² describes choline and neurine as ptomaines which may also be formed during life as leucomaines in the metabolic processes. Choline is of great importance as a type of these alkaloids, and neurine is closely related to it. Both act like curare on the end-plates. Muscarine, the alkaloid from poisonous mushrooms, is of the same class, and can be obtained also from choline by oxidation; it acts directly upon the muscular tissue itself. All these are powerful poisons, and are antagonistic to atropine in their special action on the heart and glandular system. Choline was first obtained by Strecker from bile, but choline and neurine are among the chief products of decomposition of lecithin. This important constituent of nervous tissue is found also in muscle, blood, and wherever cellular elements exist in the body; it is also in eggs, milk, cheese and other forms of food.

¹ Disorders of Digestion, 1886, pp. 42, 47.

² Chemical Physiol. and Pathol., 1891, pp. 178, 530.

In the changes of nitrogenous metabolism from nervous and muscular tissue through the complex series of transition-products to the end-products discharged as urea, uric acid, etc., these are notably augmented after excessive muscular work. There are a number of the intermediate substances which are credited with possessing an intensely poisonous action; this includes the familiar phenomena of the still undetermined uræmic poisoning. According to Gautier,¹ in the cycle of changes in the normal tissues of the body, there is constantly going on the formation of leucomaines and their subsequent destruction by oxidation before they have accumulated in sufficient quantity to produce poisonous effects. Hydrocyanic acid plays a very important part in the molecular structure of these bases. One of them, for example, xantho-creatine, studied by Gautier, is poisonous, producing in animals depression, somnolence, and extreme fatigue; and it appears in physiologically active muscles along with creatinine. Monari has found this base in the aqueous extract of the muscles of an exhausted dog, and also in the urine of soldiers tired by several hours walk.

The formation and excess of uric acid in the body, and its elimination, have been among the most thoroughly studied of all the toxic conditions. Whether it is due to an excessive formation in the liver, a defective excretion by the kidneys, or to some abnormal state of the nervous system, the many observers agree to its production of the marked symptoms noted by Murchison, among which are lassitude, headache, vertigo, insomnia, depression of spirits, irritability of temper, etc. Garrod ascribes its retention to failure of excretion; and Haig² has shown that, being formed by normal processes, its storage in the body, or excretion, are greatly influenced by the comparative alkalinity of the blood, which may be made to vary at will,

¹ Vaughan and Novy. *Ptomaines and Leucomaines*, 1888, p. 269.

² *Uric Acid in Diseases of the Nervous System, Brain*, 1891, p. 63.

within considerable limits, by the kind of food, the process of digestion, and the use of drugs. Thus the ingestion of acids, etc., reducing the alkalinity of the blood, and therefore its solvent power, causes the accumulation of uric acid in the tissues. The blood being freed of uric acid, there is diminished arterial tension, better cerebral nutrition, and sometimes a temporary sense of well-being and exaltation. This condition of the circulation is opposed to the elimination of uric acid, and favors storage and retention in the tissues, tending to later trouble. But in such cases, when from any cause there is increased alkalinity of the blood, the uric acid is more soluble, and its presence in the circulation produces the mental symptoms described.¹ Macfarlane² believes that the lessened alkalinity of the blood is the important cause of the disorders of sleep in the gouty, as being dependent primarily upon mal-nutrition of the cerebral cells, which renders them irritable and responsive to faint impressions. Cells imperfectly deprived of their detritus do not appear to take up oxygen readily, and consequently they cannot be adequately nourished; they eventually assume a state allied to that met with in neurasthenia.

According to Haig, uric acid in the blood contracts the arterioles and capillaries all over the body, producing coldness of the surface and extremities, and the headache of migraine as a local, vascular effect of uric acid. With lesser effects there are mental depression, dulness, and inability for mental effort. Von Jaksch,³ using the term uricacidæmia, has recently found that uric acid accumulates in the blood not only in gout but in anæmic conditions, and considers that the cause of its appearance is defective oxidation. Many observers have attributed gout to the nervous

¹ Ibid. "Mental Depression and the Excretion of Uric Acid." *Practitioner*, Nov., 1888.

² *Insomnia*, 1890, pp. 234-236.

³ See Halliburton, *op. cit.*, p. 733-734; and Haig, *loc. cit.*

system. Sir James Paget has pointed out that gout mainly affects the sensory parts of the nervous system. These studies show, in respect to this one toxic influence, that its presence in the body, in other conditions as well as the gouty, bears an important relation to the disorders of the nervous, circulatory and nutritional processes,—and to that striking symptom of a sub-normal surface temperature which is persistent in some forms of neurasthenia; it also produces characteristic mental symptoms and disturbance of the sensory functions.¹

The way in which repeated muscular contraction causes what is known as fatigue, is however very uncertain. In regard to the effect of the accumulation of products of combustion, the increased acidity of fatigued muscles has been noted by numerous observers since Ranke² pointed out the depressing effect on muscular irritability produced by all acids,—the carbonic and lactic among others, the muscle being alkaline in a state of rest. This excess of acid manifests itself subjectively by the sensation of fatigued, followed by sleep. The revival of exhausted muscles, upon renewal of the blood stream, is due probably both to the removal of the acids and other products of contraction, and to the fresh supply of oxygen,—the chief end-products of carbon and hydrogen metabolism being eliminated by several channels, expired air, sweat and urine. Mosso³ considers that the poison which causes the symptoms of exhaustion is probably not carbonic acid, but a substance produced in small quantities of an alkaloid nature.

In regard to the results of exercise of nerve tissue, it is believed by some that fresh brain, cord, or nerve, has normally an alkaline reaction. All observers, however, agree on the most important fact, that acidity, whether present

¹ See a review of the subject of auto-intoxication, in an editorial article on "Fatigue as a Cause of Disease," Bost. Med. and Surg. Journal, June 28, 1888.

² See Halliburton, *op. cit.*, p. 433.

³ Report of Internat. Med. Congress, Berlin, 1890.

initially or not, increases on activity, and on death, and is probably due to lactic acid. This inevitably suggests a comparison between nerve and the closely related tissue, muscle. The only known chemical changes during activity of nerve tissue is the increase of acidity; the only known physical change is an electrical one, other than those shown by the demonstrations of Hodge. Some light may come, from such studies, upon the darkness of our knowledge with regard to the essential molecular changes that attend nervous activity. In the chemical reactions the great importance of a healthy blood-supply is noteworthy here; the deprivation of the oxygen it affords means an abolition of all the higher cerebral functions, such as consciousness and volition.¹

There can be little doubt that certain febrile conditions are autogenous; they may be due to excessive formation of poisons in the body, or an accumulation of these through deficient elimination. Bouchard has shown that the urine excreted during the hours of activity is much more toxic than that excreted during the hours of rest. Both physical and mental labor are accompanied by the formation of the poisonous substances which will accumulate if the hours of labor are prolonged and those of rest shortened.² As a result of deficient elimination, "fatigue fever" is not uncommon in its milder forms, with its symptoms of impaired appetite, mental and physical "irritability," restlessness, insomnia or fitful and unrefreshing sleep, and an excited brain that will not rest. In a severer degree this self-produced condition is the "fever of exhaustion"; and this leads up to the deadly typhus which is the highest expression of the poisoning of the organism by itself or by contact with others under like conditions.³

The general truth of this matter is well summed up by

¹ Halliburton, *op. cit.*, pp. 515, 516.

² See Vaughan and Novy, *op. cit.*, p. 293.

³ See Aitken, *The Animal Alkaloids*, 2d Ed. 1889, p. 28.

Aitken¹ when he says that "the healthy living organism may become poisoned (gradually and more or less slowly) by the accumulation within its self of deleterious substances normally elaborated. Hence the slow and insidious onset of much ill-health; and from which recovery is correspondingly slow." The few examples cited serve to show the nature of the evidence, and that we have constantly to deal with definite toxic influences in the processes of nutrition and the discharge of energy in the organic mechanism. It is true that we have as yet little precise knowledge of these toxic substances, and of their effects upon the nervous system. Many of those obtained are probably formed by the action of the reagents used in the analysis, when their existence in a free state, in healthy tissue, is very doubtful. But though the science is yet in its infancy, we know enough to recognize the immense clinical importance of studying the chemical elements whose positive influence in the production of nervous symptoms must now stand as an unquestioned fact. It must be remembered also that we are still compelled to study functional "activities," and disordered conditions of which we can find no trace in the organism.

The study of the general organic mechanism, so far, shows that it may be conceived as made up of many minor mechanisms which may be studied as represented by their activities. Some general truths have been reached in regard to all of them as to their structure, their co-ordinations, and the results of their functional exercise. These conclusions are in support of my first proposition, to the effect that, when the mechanism is put into use, physiological activity and toxicity always occur together, and that the condition thus jointly produced has its first expression in normal fatigue. Moreover it appears that in pathological fatigue or nervous exhaustion, which constitutes

¹ The Animal Alkaloids, 2d Ed., p. 20.

neurasthenia, there results from excessive use and inanition, a condition of "excessive irritability and weakness" of the nervous system. There is also, in acute neurasthenia, always an increased toxicity, by its accumulation in fatigued areas, and often by general fatigue and auto-intoxication through disordered nutritional processes.

2. *Mental Elements in Normal and Pathological Fatigue.*—It is next in order to make a practical application of general truths more precisely to the nervous and mental mechanisms, and their special disorders in neurasthenia. This leads to my second proposition, that to properly study our problem we must take into account the nature and manner of production of the mental symptoms common to nervous exhaustion and insanity. This brings out the main purpose of this study of the relations between mind and body:—to show how it is that the mental symptoms furnish a ready index of the fatigue and auto-intoxication of nerve and muscle tissues, as a guide for diagnosis, prophylaxis, and treatment; and also to show how the general symptoms of nervous exhaustion can be better understood by a proper interpretation of the mental symptoms. The acute, acquired form of neurasthenia will therefore be first considered with reference to the mental symptoms, to show what they are, and how they are produced.

All observers agree that the symptoms of neurasthenia are largely subjective. There are objective signs, but the physician mainly depends upon the patient himself to tell how he feels. Every physician also learns to qualify such statements according to his estimate of the individual and his mental state, under the bias of the characteristic "hopelessness" and "worry," or even of the less intense "depression of feeling." These symptoms pertain to the state of the feelings, and constitute the emotional tone, in its intimate dependence upon bodily states which afford a general sense of comfort or discomfort,—of well-being or ill-being,

more or less persistent. This is quite independent of the intellect, and the passing feelings which are normally attendant upon pleasing or painful ideas. These disorders of the feelings and the emotional state constitute one distinct group of mental symptoms.

All the writers on this subject have also given prominence to the striking clinical manifestations of "inability to concentrate the mind,"—the weakening of the power of attention. Here is another important group of symptoms that represent disorders of the intellectual activities and the voluntary power. The most prominent of these, as a sensitive index of nervous fatigue and exhaustion, is the attention.

The Primary Data of Mental Activity,—two groups.—All these mental activities have to deal with sensations as furnishing the primary data of their operations. There are two groups also of these sensations:—the first are the general organic sensations, not intense enough ordinarily to pass over the threshold of consciousness, but they constitute the vast subconscious inflow of minor sensations through all the sensory channels that lead to the sensorium from every tissue and organ, and from every peripheral mechanism, nervous or muscular, in the body; the second are those we are conscious of as presented through the special senses and that stand in the mind as perceptions, ideas and memories;—these are the data of consciousness. The great complexity of this matter can be made intelligible by taking a little time and patience to grasp some general principles, and to reduce the complex elements to an orderly arrangement in our conception of the mental mechanism.

(1). *Organic Sensations and the Emotional Tone.*—The organic sensations in the subconscious mechanism, demand first consideration as best revealing something of the mystery in the relations between mind and body, and the genesis of the mental symptoms in neurasthenia. These

sensations, proceeding from all the states of the body, are in some degree and form represented in the sensorium. They constitute the sense of body,—the sense of personality.¹ The line cannot be strictly drawn between the conscious and the subconscious activities, as to these organic sensations. Many of the sensations received through the special senses and giving knowledge of the outer world, enter a passive consciousness, as the ticking of a clock that is not consciously perceived unless it stops, or attention is turned to it. There are still weaker sensations, coming through the special senses, of which we are not conscious. In like manner, but in reverse order, the great mass of the organic sensations are normally unperceived, but some of them may be intensified enough, as by some disorder, to enter the field of consciousness. Those arising from the trophic, and minor inhibitory mechanisms, are among the most subtle and unfelt, as are those from vaso-motor changes in the general and local circulation which are most important in their influence upon mental states. But even among these, the inner tingling sensations, followed by general chilliness and external pallor upon a sudden idea of great danger, are probably due to the swift vaso-motor constriction. There are also the normally unperceived, though incessantly repeated sensations, which provoke and accompany the respiratory movements. They may arise also from the state of the muscles after exercise, even when inactive, giving the feeling of fatigue and exhaustion; or in an opposite condition may afford a general sense of vigor. The muscular sense is a stronger representation of the organic sensations that are sometimes classed with the special senses. Hunger and thirst are not localized sensations, but result from a discomfort of the whole organism, being connected with the state of nutrition.²

¹ Ribot. *The Diseases of Personality*, trans. Chicago, 1891.

² Bain. "The Senses and the Intellect," 3d Ed., 1888, Part II.

Sense of Well-being.—These normally latent or obscure sensations, low in intensity but great in volume, are persistently flowing inward beneath the fewer but relatively intense and transient sensations from the special senses. In the healthy organism, refreshed and vigorous, there is an equilibrium of physical sensations, or a multitude of agreeable feelings attendant upon the exercise of normal power. This physical state produces a mental sense of well-being; the persistence of this will give its special character to the physical and mental habitude, or the personality of the individual.

Sense of Ill-being.—But in the conditions, represented by a sense of ill-being, there are feelings of fatigue, depression, anxiety, languor, absence of desires, a sense of lack of power, of self-depreciation, and of personal unworthiness, etc., of which the patient gives account. Beard has well characterized this "as an instinctive consciousness of inadequacy for the task set before us." "We are hopeless," he says, "because our nerve force is so reduced";—"a certain amount of nerve strength is necessary to supply the courage requisite for simple existence." The persistency of these feelings is marked by a visible change of personality. In slighter degrees these changes are like those commonly seen in the evening tire of an active man, from which restoration follows. When, however, in the processes of waste and repair, the balance turns slowly and insidiously to the side of weakness of nervous tissues, whose corresponding mental activities show these symptoms of disability, they stand as evidences of a neurasthenic condition. As these morbid physical states persist, the ideas suggested by the morbid feelings, and to account for them, are framed by degrees into some wrong conception. Although there are, however, many cases of melancholia without delusions, yet beliefs may be engendered consistent with the morbid state of hopelessness, self-reproach, and worry. In many cases

special delusions are formed for which the patient gives reasons, with a degree of intellectual integrity that is peculiar to melancholia. These allied organic and consequent mental changes profoundly modify the personality in its inmost nature. By the process described this is not the violent and superficial effect of sudden emotions, but results from a slow and subtle process that irresistibly changes the basis of the personality. It is easy to see how such morbid organic sensations may be engendered in a general neurasthenia and produce such a train of nervous symptoms, characterized by a sense of ill-being, depression and hopelessness. Like results may come from nervous exhaustion initiated in the brain itself, by mental overwork, care and anxiety. Here is the bond between well-being and ill-being of body and the emotional tone. It is plain how the changing states of mental feeling reflect the bodily states in the alterations of the sense of personality.

Mental Symptoms of Auto-intoxication.—The new evidence in regard to the toxic elements engendered in the body sustains these views, and seems to offer the long sought explanation of many obscure conditions. Full force should be given to the fact that in all forms of functional activity the fatigue proper, from the discharge of energy and the breaking down of material cell contents, has always joined with it the toxic influence of self-produced waste products. We are able to account for much that appears confusing in the symptoms of fatigue, by ascribing their variations to differences in the kind and quantity of the specific poisons that are developed in the various tissues. For example, while melancholia is generally characterized by a disposition to quietude and shrinking into seclusion, some cases are marked by great mental agitation and physical restlessness, the essential physical and mental condition being the same. A fair inference is that there is an irritating intoxication in such cases. But again there is the peculiar condition of

apparent stupor added to the ordinary melancholia, so that in extreme cases the patient cannot move his limbs or utter a word, and the facial expression is blank. This presents a more profound degree of the condition described by Brunton as like the poisoning by curare of the muscular mechanism. The absence of true psychic stupor in many such cases is well proven. It has been seen that these symptoms may be produced by choline, neurine, and muscarine, which are antagonistic to atropine. In Hare's suggestion that it is possible to give relief by antagonistic remedies when there are signs of auto-poisoning; he mentions dilated pupils, a hot and dry skin, dim eyesight, rapid pulse, as like the effects of atropine. Symptoms resembling them in lesser degree are seen in both neurasthenia and melancholia. Again a slow and full pulse with high arterial tension, and a throbbing frontal headache, suggests the ptomaine like digitalin. Some of these poisonous substances lower the temperature; it is often sub-normal in the graver neurasthenic conditions. Upon the basis of such causes, and such a method of production, the "excessive irritability and weakness" of neurasthenia seem amply accounted for. By means of local perversions, the weaker organic sensations sometimes come to be felt, and may be so intensified as to bring them into the group of those that are consciously perceived and localized. Languor, dulness, stupor and lethargy are like manifestations of toxic influences. These altered sensations will be hereafter described. They are of great psychological importance. Reference has already been made to the relation of uric acid to diseases of the nervous system, and the characteristic symptoms of lassitude, depression of spirits, etc. Its formation, elimination, and possible excess in the blood, are so essentially connected with the processes of waste and repair as to make these symptoms most significant in their relation to neurasthenia.

The conditions of mental feeling, marked by the emotional

tone, as states of well- or ill-being, have now been shown to be intimately bound up with the great volume of subconscious bodily feelings, and representative of their predominating quality. They are normally so low in intensity as to be undiscriminated; but when intensified by morbid conditions they become symptoms of the existing disorder.

(2). *Sensations from the Special Senses;—Perceptions, Ideas, etc., and Disorders of Intellect and Will.*—It now remains to consider the other group of symptoms representing disorders of the intellect and volition as distinguished from mental or physical feeling. Of these disorders the most important indications pertain to the attention. All writers on neurasthenia have noted the fact that the mental symptoms of the higher order are always prominent. But what is wanted is a sufficient analysis of them to show their twofold significance. A brief explanation should make this clear, and easy to understand, as it is necessary to be known. On the one hand the disorder may begin below in the sources of organic sensations, and extend upward into the higher mental sphere. The great mass of sensations beneath are summed up into our sense of physical personality. Compared with them, all that comes into our conscious minds through the special senses, and the succeeding perceptions, ideas, memories, judgments, feelings and volitions, in the "circuit of consciousness," represents a small item. In acute neurasthenia, and true melancholia and mania, there is always nutritional, toxic and functional weakness, fundamentally, in the organism; it is from this that the influences arise which affect our conscious feeling and thinking, making these higher mental states the sensitive indices of the lower physical changes. For like reasons these subconscious changes of personality, pervading and voluminous, have a predominating influence. When all goes well with the organism, and it is in a condition of unfelt equilibrium, the processes of thinking and feeling are adjusted,

more or less logically, to the varying environment, upon a basis of a sense of well-being and normal love of life. On the other hand, a morbid process may be started in these higher activities, in a previously healthy and strong organism; but until the organism itself suffers a change to the specified nutritional and functional weakness, there can be no such mental symptoms as are being studied here. Normal mental activities cannot produce "mental symptoms" except by first causing the characteristic "weakness" somewhere in the physical basis of them all.

Familiar Facts of Mental Manifestations. Consciousness.—There is no need, in this matter, of entering into psychological speculation. It is only necessary to consider the final facts of the manifestations of mind with which we are most familiar. We commonly note the fact of consciousness for example, and distinguish between such states as its absence in coma, its partial presence in sleep, or its full activity in an alert and intelligent mind when we cannot doubt that some activity of organic elements is added which was not present in the less active states,—as of coma, for example. We use many phrases to describe different degrees of this activity, meaning always a state of consciousness the sum total of all its activities.

The Attention.—The attention is the term applied to denote the mental action when a particular object of thought is held in mind to the exclusion of others. Active consciousness is always attending to some one presentation in its field,—this action is attention, and this activity is always going on in connection with every other mental action, or object of thought. The mind may attend to the presented perception of a new sensation,—a re-presentation in memory,—an abstract conception,—or the idea of a muscular movement. The larger importance of the attention is due to the fact that in it resides the inhibitory power over all mental operations. The attention is to these what the

physiological principle of inhibition is to the lower nervous mechanisms. It is the abatement of this higher inhibitory power, and of its regulating and guiding control, that appears early and most constantly in mental fatigue and weakness. This is manifested by changes in the power of attention.

Ribot¹ has made very clear, by a simple analysis, the office of the attention. It acts in two forms:—voluntary attention is its acquired form gained as a result of the higher evolution of man;—spontaneous attention is its natural or primary form, when its action is attracted or reflex, as is so manifest in children and animals.

Spontaneous Attention.—Spontaneous attention being first considered, the essential fact is that it is always attracted to the object or idea in the mind that most interests it, or keeps it on the alert. This idea may be intensified in interest by pleasurable or painful feeling,—by a desire or a fear. Now it has been shown that when the emotional tone represents physical well-being or ill-being, ideas harmonious with the emotional tone will be intensified. It has been shown also that in states of ill-being and depression the attention is persistently attracted by painful ideas which are thereby further intensified. Thus a state of habitual mental pain shows attention attracted by, and dwelling upon, painful ideas. This is the basis of worry, and it is thus shown how worry intensifies its own cause. The clinical significance of worry, therefore, is that the weakened attention is being occupied by painful ideas which are intensified by the exaggerated influence of a painful emotional tone representing a weakened and irritated physical basis. The painful ideas are further intensified by the concentration upon them of the attracted attention. When only attracted attention is in action, as in extreme conditions, the spontaneous flow of ideas goes through

¹ The Psychology of the Attention, trans., Chicago, 1890.

the mind in a wandering train, as in dreaming or delirium, without check or guidance; and those ideas in the train most attract the attention which are then in harmony with the emotional tone.

Voluntary Attention.—The exact antithesis of this is voluntary attention. As to this, the essential fact is, that it is the activity of inhibition. The attention directed and concentrated upon a chosen object of thought is an act of volition. A man controls his own mind by willing his attention, as it were, to be fixed upon some one item or object, in the train of presented ideas, to the exclusion of others. He thinks about what he chooses to think about; he may make the most worthy object the most interesting; by dwelling upon its worthiness he intensifies it, thus resisting the attraction of less worthy interests and emotions. This directing of the attention by the will may control and guide the processes of thinking,—may inhibit the promptings of the emotions in conduct; and it does manifest itself in all voluntary action. Attention has always a motor element and expresses itself in muscular movement. In a healthy man, with a refreshed and vigorous organism, and a trained intelligence and attention, is found the most efficient expression of this higher power of inhibitory and guiding control. This is an acquired power, improved by training. Now it is plain to see the importance of the clinical signs in regard to the higher inhibition. Let there be weakening of nervous energy from any cause, then the weakening of the voluntary attention is a direct and immediate sign of mental and general tire or exhaustion. It may be that, in such a state, as much or more "control" is exercised, but it requires more effort and expenditure of nervous energy.

The more the higher control power is lessened, the more the spontaneous attention is left free to act. The gradual reduction of the control power of the voluntary attention is

matter of common clinical observation in normal fatigue, neurasthenia, melancholia, etc. Here then is further shown the bond that extends between the changes in the physical basis of the personality and the changes in the higher power of attention which thus becomes a sensitive index of bodily conditions. The mental attitude at any given moment is determined by the state of the attention. This is always tending to act in a reflex and spontaneous manner according to the emotional tone, as attracted by the most interesting ideas. When bodily feeling is in equilibrium the voluntary direction of the attention is easiest; but direction is always inhibition,—by will and choice the ideas are held in view that stir the worthiest feelings, or a consenting will yields to those made interesting by desire. Then feelings as motives add intensification to the mental attitude, and again we find the potent influence of the emotional tone. It controls or is controlled. This brings out the practical point that is of present interest,—the need of the higher inhibitory control and what it works against. According to Foster, just as physiological inhibition plays its part in the lower mechanisms, so is it important in the whole work of the central nervous system. He says,¹ "In all probability many of the phenomena of nervous life are the outcome of a contest between what we call inhibitory, and exciting or augmenting forces."

Another practical point is of the greatest importance here in regard to the higher inhibitory control, acting through voluntary attention. It is the application of the principles in the laws of practice, habit, and association. The mental activities do not escape the full force of these laws. When once a mental attitude has been determined by the interplay of ideas, feelings, and controlling or consenting will, there is a functional disposition to repeat the organic and attendant psychical processes. "Habits of thought" are

¹ *Op. cit.*, p. 918.

acquired, and they are characterized either by a habit of yielding to impulsive emotion, or as determined by a controlling inhibition. The principle of practice is in like manner always ready to reinforce the power of voluntary attention. Hence we see that the attention, as the agent of the will, has to work against also the effects of practice and habit which tend to become fixed by states of feeling, the associations of which with ideas are also strengthened by habit; while at the same time, voluntary attention trained by practice leads to the highest acquirements of mental power. Conversely, we see the import of the lessening of inhibitory, selecting, and directing power in states of nervous fatigue and exhaustion. Whatever the physician may discover in the bodily condition of his neurasthenic patient, or whatever he may infer of its pathology, he should always remember the effects of habit in the mental activities. The nervous invalid may remain such, even under strongly recuperative tendencies, simply from mental habit, confirming it both by misuse and disuse of normal power. The patient, powerless to contend alone against the forces of weakness and habit, must have a physician for both mind and body.

Mental Symptoms in Normal Fatigue.—The fatigue of the attention will vary in its manifestations in different degrees of nervous fatigue and exhaustion. Its predominating significance is also shown by its relation to mental symptoms which may be sufficiently illustrated by a not uncommon experience. Suppose that after a day's professional labor you have spent a long evening at your desk. Your probable mental condition may then be as follows:—There is lessened mental activity. Voluntary attention is fatigued, and in spite of much effort you repeatedly find your spontaneous attention attracted along some train of ideas to a subject remote from the one you are trying to keep in mind. Sense-perception is less acute,—the atten-

tion shows fatigue by inattention to incoming sensations. There is less power of memory,—it is less retentive, because diminished attention to impressions renders them less vivid,—its recalling power is slower and weaker,—and in the underlying association of ideas there is a spontaneous flow which is controlled only by unusual effort of will,—the association process is itself slower, the vocabulary diminishes, and even familiar names and words may not be recalled. The logical processes work more slowly in making comparisons and judgments, and in reasoning to conclusions,—the tired attention with effort holds on to one member of a proposition while another slips away. With growing torpor your attention may cease to be stimulated and you may fall asleep. There is a lowering of the emotional tone and a quietude of feeling with lessening of natural vivacity; there is a diminished sense of adequacy of power, and tasks seem difficult that after rest will appear easy enough. An abatement of power to control the motor mechanism is apparent as requiring more effort of attention. This is normal fatigue; it will be seen that in every phase of these activities the attention shows the effects of fatigue in lessened control. Restoration follows when in the repose of rest and sleep, the circulation removes the acid waste products, etc., that caused the somnolence, while it supplies the materials for rebuilding the cell-contents so that they may again yield energy upon being stimulated.

Mental Symptoms in the Genesis of Pathological Fatigue.—When the process of restoration is continuously incomplete, and after a time a similar degree of exhaustion is persistently established, the symptoms may not be quite the same in respect to the toxic influences. It is plain that there will have been going on an active process of removing them, though incompletely; and we have to conceive of a partial inanition and an irritating intoxication as contributing to the “excessive irritability” when it

exists, as it commonly does, in neurasthenia. Then the normal fatigue has passed over into pathological fatigue. Recurring now, for example, to the picture of evening fatigue, after a day of hard work both physical and mental, a significant sequel might follow it. Suppose then you are suddenly called to a patient, whose life is in danger. You are aroused. For many hours you may anxiously work over the case with no apparent lack of energy or failure of the resources of your experience and skill. But when relief comes, and you try to get rest in sleep, you only lie awake, restless, your mind excitedly reviewing the scenes you have passed through, your will powerless to inhibit the train of ideas, and you have a painful sense of nervous tension and irritability.

There would seem to be in this condition a ready explanation of acute exhaustion, or excessive fatigue and toxicity. This is the initial stage of pathological fatigue. Such an incident is instructive in many ways. It shows how the store of nervous energy is held in reserve, within the limits of normal fatigue under ordinary stimulation. But unwonted interest being aroused and attention stimulated, the mechanism responds with an increase of cerebral circulation, and large cortical areas are probably excited to action. While more nutrition is thus taken up, more energy is given out; and although there is a more rapid removal of waste products it is not complete, and these gradually accumulate until some degree of exhaustion is manifested. Then in the search for the power of control over mental processes, the attention failing in its office becomes conspicuous by its absence or lessened power.

The mental mechanism is commonly stimulated to action by the external circumstance, as in the incident just related. The interest excited by the event arouses the attention which, acting in both its reflex and voluntary forms, intensifies all the mental activities. A like experi-

ence is still more common, in which there is absence of immediate objective interest, and the mental action proceeds more subjectively and from volition. Take another instance of evening fatigue, and suppose, for example, you have been delaying the writing of a medical paper which must be read to-morrow. With fatigue equal to that yielded to many times before, you approach the task to which a mixed interest is now added by your reflection upon the need of preparation and the consequences of failure to acquit yourself properly. With much effort of will and attention, you apply yourself to the beginning of the mental work. Presently the sense of fatigue and effort has passed away,—the subject itself gathers interest,—and you have a sense of satisfaction in the exercise of mental power. You may desist at last, not with consciousness of mental fatigue, but because the lateness of the hour claims your attention. But as before you may lie awake with an over-stimulated brain and weakened inhibition; and this condition may represent simply a less degree of over-fatigue than in the former instance.

In the first of these two cases, external circumstance furnished the immediate stimulating interest;—in the latter case it is memory and expectation, but the attention is more clearly voluntary and the whole process subjective. In both cases the rôle of the attention is apparent. It becomes evident also that the feeling of fatigue does not measure it, but only represents the fact of fatigue within normal limits, beyond which there is a reserve of nervous energy that may be drawn upon by stimulating the nervous mechanism through an extra effort of voluntary attention. The explanation of the attendant physiological processes throws light upon the whole matter. Ribot¹ says it is highly probable and almost universally admitted, that attention, even when not directed toward any region of the body, is accompanied

by local hyperæmia of certain parts of the brain. This result of the greater functional activity is caused by a dilatation of the arteries, which itself is caused by the action of the vaso-motor nerves upon the muscular integuments of the arteries. But the vaso-motor branches of the great sympathetic are independent of the action of the will, and are not influenced directly by voluntary attention; they are however subjected to all the influences of the emotions. It is shown by the experiments of Mosso and others that the slightest and most transient emotion causes an afflux of blood to the brain. Maudsley² says, "We may fairly conclude that the effect of attention to a current of thought is to quicken the circulation in the nervous sub-strata which minister to it; not otherwise than as when some earnest thought has taken hold of the mind, it keeps up an active circulation in the brain, and will not let us go to sleep."

These considerations enable us to distinguish the main elements of the mechanism that were involved in the last two cases of evening fatigue. In both, interest and emotion were the immediate excitants of the increased blood-supply and brain activity;—in one, the emotion attended the thought of the external circumstance of a patient in danger, and attention was largely spontaneous,—in the other, the emotion accompanied the thought voluntarily chosen to be held in attention, although its interest was more remote. So the attention once becoming active, in whichever form, the same results then followed in either case, and the order was as follows:—attention, intensified ideas with mental feeling of interest or emotion, vaso-motor dilatation, quickened circulation and nutrition, increased expenditure of energy and waste products, and over-fatigue to the degree of exhaustion and irritability.

These phenomena of our commonest experience therefore bear this plain interpretation. It is fundamental in our

² *Physiology of Mind*, 3d Ed., p. 316.

nature, in the earlier stages of development, as in children and animals, that our inner physiological activities and their expression in conduct are largely subject to the feelings,—our mechanisms are driven by untutored interests, emotions or blind instincts. But in the later development of the acquired forces of intellect and will, we control, select, and direct, through attention, the chosen, impelling interests, combined with much yielding and consenting to the primary forces of our emotional nature.

It is a common clinical observation that, with the beginning of failure of higher psychical control, the more mechanical laws of cerebration are brought more freely into play, and we come at last to the phenomena of weakening attention as the index of the more spontaneous flow of ideas along the paths of habit and association. Fatigue of the power of voluntary attention, which goes along with cerebral fatigue, is equivalent to the beginning of the failure of control.

In the mental conditions last described, the symptoms of a general and cerebral neurasthenia thus developed reveal the importance of the attention, and the high office of its voluntary power in respect to all mental activities. In the abatement of natural vigor in any of them, the physician should see signs suggestive of neurasthenia.

The Sense of Effort, and Discharge of Energy in Attention.—A further development of symptoms may follow if the patient continues in a neurasthenic state. While the action of spontaneous attention is always without a sense of effort, as in its passive exercise in reverie which may be restful, it may on the other hand when concentrated, as in continued worrying, be accompanied by expenditure of energy and cerebral exhaustion. Hence the maxim that worry is worse than work. But voluntary attention is normally accompanied by a discharge of energy and a sense of effort. The feeling of effort is at a minimum when the

body is strong, but with increasing fatigue the sense of voluntary effort grows greater because more is needed to accomplish the same result as before. This of course is attended by a conscious sense of mental inadequacy through a sense of resistance to effort, which, added to the feeling of physical inadequacy already existing and accompanied by painful emotion, increases the force of self-depreciation. There is deeper depression, more intense worry, increasing cerebral exhaustion, and lessening mental control by will and attention.

Correspondence of the Train of Mental and Physical Events in Neurasthenia.—The preceding analysis of these conditions shows what may be the train of concomitant and increasing disturbances of nutrition:—there is local and then general inanition and irritating auto-intoxication,—then vaso-motor constriction, perhaps from irritative elements in the blood, and local or general anæmias,—or a vitiated blood-supply that does not nourish,—or again a hyperæmia from which we may infer a constriction-paralysis, in a condition manifested by a temporarily increased activity, and mental facility which is still a manifestation of inhibitory weakness. Thus a process beginning in the general organism, perhaps with disorders of digestion, may lead by a sequence of events to such results as these. The causes continuing, or being renewed after partial recovery, which may happen many times in a single case, the descent to graver degrees of exhaustion in melancholia may be accelerated by insomnia. This, we have to infer, is due to a hyperæsthesia from weakness and toxic irritation of the central mechanism.

The process may begin with an earlier event:—through necessity or mistaken zeal the individual over-exerts his brain in mental work under the spur of interest and forced attention. Here is indeed purely mental initiation of cerebral exhaustion which may start the train of events even in a strong man. Then with an over-worked brain, and under-

worked respiration and muscular movements, as in sedentary habits, the cerebral waste of tissue is increased and the nutrition is diminished, by both local and general conditions. Such a special condition, for example, as the uric acid diathesis, may be engendered by deficient elimination. From a cerebral neurasthenia all the other events may follow. In this form, however, there may be failure of special functions, as of memory, for example, in some of its elements. A not infrequent symptom is forgetfulness of names and words,—the fatigued word-memory centres are slow in recalling, or the word-uttering centres are slow in acting, and there are the symptoms of brain exhaustion with a hesitation of speech that is unduly alarming. The mental work of a physician or a lawyer is a good example of a peculiar strain of these central mechanisms. There is the daily continuous effort of listening to the details of medical cases, or to evidence and pleadings in some important cause, often followed by work at late hours. It is not strange that there should be a consequent condition of special fatigue of the attention and memory.

The Unity of Conditions in Neurasthenia and Melancholia, etc.—The essential element in all cases is, that the fact of a profound deterioration of nervous energy in the organic basis is represented mentally as a more or less vague sense of failing power, together with a conscious reduction of mental control. This is true alike for neurasthenia and melancholia, as has been shown.

Alienists have long recognized these morbid states as associated with variations of nutrition and as fundamental to melancholia, hypochondria, and other like disorders.

Meynert¹ believes melancholia to be a symptom of disturbance of nutrition of the cortex of the hemispheres dependent upon diminished blood supply. Benedickt² believes

¹ Wiener Med. Presse, June 6, 1889.

² Medicine Moderne, Feb. 5, 1891.

that neurasthenia is a psychic disease of cortical origin, due to emotion and overstrain, and that it is peculiar to the learned professions and business demanding trained, alert intelligence. Marcus' describes neurasthenia as a change in the functional tonus of the whole central nervous system, with increased excitability and tendency to exhaustion. The patient is always depressed on account of his incapacity, which leads to doubt, anxiety and hopelessness, with a feeling of inadequacy to ordinary effort. These patients are neurasthenic, he says, before becoming insane.

Thus it is to be seen that the neurasthenic condition, being dependent primarily upon nutritional weakness and presenting a train of definite mental symptoms, may, when once established, grow worse by degrees even to the profoundest melancholia, in which the same physical conditions and the same mental symptoms, from like causes as in neurasthenia, are present as a part of the characteristic group of symptoms. It may be said, as Beard tried to show, that neurasthenia is not melancholia, but it cannot be said that melancholia is not neurasthenia. Many cases called neurasthenia are as truly mild melancholia. It is a matter of the degree of exhaustion; in the graver degrees new symptoms are added. Further evidence of this is to be seen in the study of the intellectual symptoms in still more profound degrees of exhaustion. But it is already evident from these considerations that, in all these conditions, the symptoms are dependent primarily upon changes in the organic basis of the personality.

Definition of Neurasthenia.—A summing up of the conditions that furnish the clinical manifestations of melancholia would include those of neurasthenia and more. The study of melancholia, as has been said, is therefore instructive as revealing the import of the milder manifestations in neurasthenia. The common conditions of nervous weak-

¹ Allgem. Zeitsch. f. Psych., xlv. 487, 1889.

ness and irritability, and of the special weakening of the attention and mental depression, have been sufficiently noticed. But one other prominent condition should be taken into account in the definition of neurasthenia. The physical lassitude and languor, and motor weakness, pointed out by Brunton as suggesting curare-poisoning, has its counterpart also in the condition often observed in melancholia and characterized as mental stupor which it simulates. The definition of neurasthenia, properly extended to include the more prominent manifestations, both mental and physical, may be stated as *a morbid condition of the nervous system, the underlying characteristics being excessive weakness and irritability or languor, with mental depression.*

Cerebral Neurasthenia, and "Insistent and Fixed Ideas."—Cerebral neurasthenia being once established the general form is then usually developed; but the first may exist by itself, as has been shown, and be of long standing in a healthy organism. The same is probably true of spinal neurasthenia. This central affection is likely to involve, directly or indirectly, other co-ordinated mechanisms. An acute neurasthenia may be rapidly developed by mental shock or the like; it is as if, by a great discharge of energy, the brain cells are quickly brought to a state of exhaustion with inability to perform fully their function of taking up nutrition, or to act in their normal and habitual associations, because of being "thrown out of gear."

A unique form of cerebral neurasthenia may be brought about by the affections known as "insistent and fixed ideas." These are often started accidentally as uncorrected associations of ideas and feelings, and being at first purely disorders of ideation they become fixed by habit and intensified by accompanying emotions usually painful, and sometimes engender great worry and anxiety, because the patient is conscious of his inability to control his own mind against the ideas he knows to be absurd. The worry in these cases

may cause a true cerebral neurasthenia. There is a special form of these "fears" that is the most likely to lead to a true melancholia in cases in which there is a strong body with a tired brain,—it is the fear of heredity, when based upon a fixed idea that may have some appearance of truth and cannot be corrected as being absurd. Then the worry is increased both by habit and fatigue. In general it should be said that "insistent and fixed ideas" are primarily accidental disorders of ideation, often occurring in the strong but more likely to happen to the weak. They are the cause of neurasthenia quite as often as they are a symptom of it. The morbid association being once formed, it becomes fixed by habit, inducing or increasing the cerebral fatigue, and constituting an association-psychosis, or more properly an association psycho-neurosis. When these affections are better understood, an explanation will probably be found for much that is now called hysteria, the neuro-mimesis, etc., including, in the insistent associations, other feelings than fears, that occupy the attention.

Secondary, Chronic, and Hereditary Neurasthenia.—The forms of neurasthenia so far discussed are those that are acquired, acute and primary. Secondary neurasthenia, or the form occurring after other definite diseases, often not nervous, must be regarded as belonging to the class having special toxic causes. The poisoning may be direct, and sometimes recurrent, as in the specific constitutional diseases, due to, or inducing, nutritional and degenerative disorders, such as gout, rheumatism, syphilis, etc. Or it may be indirectly due to such diseases as puerperal fever, typhoid fever, etc., in which it may be inferred that, although the toxic materials have passed away, a process of inanition once started persists, or continues to develop. Chronic neurasthenia has already been characterized, and includes conditions of partial recovery, in which a "constitutional predisposition" is fully acquired and established. This is

consistent with periods of partial efficiency and comfort, with lessened reserve energy.

Hereditary neurasthenia, as a transmitted predisposition, is a usual cause of localized neurasthenia in special systems or organs. In these cases and in those with a general neuropathic condition, often inherited, there is a tendency to all forms and degrees of neurasthenic disorder, for the reason that, it being a condition of nervous instability and weak resistance, the organism yields to slighter degrees of stress than in ordinary states. The nervous equilibrium becoming unbalanced by slighter causes the departure from the general habitude of the individual is less, and restoration to it easier, than when the normal resistance is great and the break-down is a greater change. When a strong man breaks down it may therefore be more difficult for him to get well than for one less robust and stable. When there is such a predisposition, however, the prophylaxis should be more diligent against neurasthenia and mental disorders. It should be remembered also that in these neuropathic cases one may inherit a strong brain and a weak body, and *vice versa*.

Symptoms.—The symptoms of neurasthenia, being manifestations of weakness of the nervous system, proceed from variations from the normal condition of nerve-cells,—molecular and chemical, not yet demonstrably pathological, and implying a weakened or changed nutritional power. The vascular changes—the cerebral and spinal hyperæmias and anæmias—are due to disturbances of the inhibitory vaso-motor centres. As Dana says, "Neurasthenia is primarily cellular and secondarily vascular." Local anæmias may be initiated by an irritative blood-supply,—the vaso-motor constriction starting the deficiency of nutrition in the nervous centres; we may infer that this leads sometimes to hyperæmias, just as digitalis first stimulates the cardiac inhibition, and then by over-stimulation and a toxic effect paralyzes it.

The fundamental and initial condition being thus a weakness of nerve-cells from excessive waste and deficient repair, to which there is a toxic addition to the "fatigue," then two types of symptoms must be recognized,—those characterized by a too quick response to stimulation, due to "irritability" or hyperæsthesia, and those due to a slowing or annulment of functional power, manifested by "languor," or even a complete suspension of function. These conditions of abated power, with "irritability" or "languor," occur in different degrees, and are common to the sensory, central and motor parts of the mechanism; they often affect one part more than the others, according to the localization of the "fatigue," or the kind of toxicity. The symptoms of neurasthenia are mainly *subjective*.

The *objective* symptoms may be first considered, by noting the common physical conditions. There is a general appearance of abated vigor, bodily weariness, languor and mental depression, and loss of weight. There is not necessarily anæmia, but this is common in young persons and women; it is not present in many adults who may be physically well-nourished or plethoric. There may be tremor of the hands, sometimes only following muscular effort or mental excitement. Uncasiness, restlessness and excessive irritability are also common.

Loss of vaso-motor tone is indicated by cold hands and feet, and the temperature is often sub-normal in the more exhausted cases. Morbid blushing is common in nervous exhaustion in both sexes, from slight mental or physical causes. A characteristic form of the blushing is that which occurs in patches upon the neck and cheeks, of a bright color and with well-marked borders slowly spreading. This may appear with only the effort and interest of an ordinary conversation. The disturbances of the circulation are marked by cardiac palpitations, and the phenomena of an "irritable heart." The pulse shows frequent and rapid

variations in arterial tension; it may be reduced in frequency with increase of tension, or be more frequent and weaker, and often quickly accelerated by exertion or slight emotional excitement.

Dilatation of the pupils is a common symptom, and may be due to paralysis of the third nerve or irritation of the sympathetic. These suggest nervous weakness, irritability and perhaps different toxic influences. A striking peculiarity is a quick and frequent alternation between this and contraction. The atonic voice is peculiarly significant,—it is faint and husky, and frequently varies in force. Sometimes it will suddenly change to a higher pitch and sound thin and weak. Respiration is not changed in frequency, but deficient respiratory expansion may be observed, with the symptoms of compensatory sighing and yawning.

The appetite is poor; there are disorders of gastric and intestinal digestion, gastric irritability with atonic dyspepsia, and constipation, sometimes alternating with nervous diarrhoea; and flatulence with feelings of distention; there is gastric neurasthenia, and a "torpid" or "neurasthenic" liver, and the important toxic consequences. Elimination generally is greatly at fault, by liver, kidneys and skin. The urine varies in specific gravity, being usually low in younger persons, with phosphates in excess. Older persons have more digestive and hepatic disorder, and a condensed urine with sometimes excess of phosphates, urates, and oxalates. Traces of albumen and casts are common in the depressed cases, as in melancholia. The peculiar symptoms of "uric-acidæmia" are so common in neurasthenic conditions that a careful study of this toxic element is likely to be profitable.

Neurasthenic irritability of the bladder and urethra occurs in both sexes; and in women the lowered nervous tone is manifested in menstrual disorders. While amenorrhœa occurs, particularly in the graver cases, as in melancholia,

etc., it is often physiologically conservative; there may be an increase of the flow, and even the ordinary amount, in anæmic conditions, becomes relatively a hæmorrhage. Many such cases are kept indefinitely in a state of exhaustion by losing monthly all the upbuilding they can gain. Irregular menstruation and dysmenorrhœa are also common. Women in general suffer more than men from sensory and irritative symptoms,—there is more pain, headache, and neuralgia, and the complications of hysteria occur. The diseases peculiar to women may be either the causes or effects of neurasthenia. The symptoms of sexual functional disorders, generally, should always be first studied carefully, as probably expressions of a general neurasthenia. This is true also of the disorders peculiar to adolescence and the climacteric,—at the latter period of life men also are prone to neurasthenic troubles.

Insomnia has already been especially noticed as a symptom of irritability,—a cerebral over-excitation from local irritation, or that condition initiated by intensified interest and attention until the symptoms of "fatigue" supervene. Macfarlane defines insomnia as an evidence of vigilance in the cerebral cells, initiated and maintained by some perturbing element in the system, of which it may be the sole symptom.

The *subjective* symptoms are thus broadly characterized for convenience, as those of which the patient himself gives account. This division from the objective symptoms is open to criticism; the thesis of this discussion is, in part, to show that the inner conditions are largely revealed by mental symptoms which are obvious to the clinician who obeys Krafft-Ebing's injunction to pursue an untiring observation of the psychical processes. While the patient may describe his feelings and tell his thoughts, in their subjective aspects, the clinical observer sees the plain and often contradictory significance of the patient's unwitting expressions of mental

phenomena that are objectively manifested in his appearance and conduct. The physician, taking into account all the data, solves paradoxes and makes interpretations, that the patient cannot make of what he feels and seems to perceive. It is a part of the present purpose to make clear some of these apparently conflicting indications.

The study of the symptoms of neurasthenia means, then, the observation, and the careful analysis and discrimination, of the physical signs on the one hand, to differentiate them from the manifestations of more definite nervous diseases which are so often simulated in this disorder. We have, on the other hand, with these observations as guides, to discriminate in like manner the mental signs as expressed in the patient's appearance, conduct, and speech. The subjective symptoms are, therefore, of two kinds,—what the patient tells of his bodily sensations and mental feelings, and of his ideas of them, and what he manifests otherwise as expressions of his mental condition. The business of the physician is to make an interpretation of these phenomena, consistent with physical facts, and to give his patient treatment that is often as much of the mind as of the body.

The first and most obvious mental signs, taking the evidence from both of the sources just specified, are the characteristic depression of feeling,—lowering of emotional tone and a sense of ill-being. Coincident with these, but derived more from the patient's own statements, are a decrease of the power of voluntary attention,—attention becoming reflex,—and sometimes decrease of the power of memory in its elements of retention and recalling, and in the association of ideas. The first order of these symptoms represents, in the changes of emotional tone, etc., the concomitant changes in the organic personality,—the patient speaks despondingly and appears dejected,—he has "the blues." The second order shows, in the lessening of men-

tal activity and inhibitory power, the abatement of cerebral energy,—the patient becomes conscious of this because of the increased sense of effort, and he may tell of it before it can be observed by others.¹ The sources and “mechanism” of these two orders of symptoms have been shown.

A third order of symptoms proceeds from the first two, as has been shown; it is somewhat later in appearance and marks a graver degree of nervous exhaustion. It includes introspection, or dwelling by attracted attention upon anxieties or painful ideas, intensified by the prevailing emotional tone,—retrospection, which is a constant and striking symptom in those who, from a sense of inadequacy, lose hope and therefore *interest* in the future, and find it in the reviewing of past experiences, errors or wrong doings,—and apprehension, as sometimes a feeling of hopelessness, or vague fear of inability to meet the requirements of the future or the consequences of the morbidly intensified memories of past misdeeds. These constitute the condition of worry and hypochondria.

All these orders of symptoms are usually present in slight degrees, and coincident at the very beginning of pathological fatigue. Their severity increases with decreasing energy,—from transient “fits of the blues” to the most marked forms of the disease. When the condition continues, reasoning is likely to be soon influenced by the bias of morbid feeling, and the law of practice, habit and association comes in, tending to fix the morbid “habits of thought” as well as the disorder in the concomitant physiological processes. Then secondary effects begin to demand discrimination, and the force of habit must never be forgotten. For example, a business man, having become neurasthenic from over-work and worry, may attend to his affairs, with excess of application, and feel better doing so, through the effect of habit, and the stimulating effect of attention and interest as excitants of cerebral activity and a quickened

¹ See Notes, p. 105.

circulation. Let him attempt, however, to turn his attention to other matters, as to rational recreation, and his loss of power to control his own mind betrays itself. At the beginning of the attempted relaxation, as in taking a vacation, there is more of mental effort, and of the depression of feeling, than in keeping on with his habitual occupations, though harmful. Or, again, such an experience as that described in a letter from a medical friend, who has had large success in treating neurasthenia, and who contributes unintentional testimony on this point, as follows:—"I have been feeling so good-for-nothing and so blue that I have feared almost everything. These 'rheumatics' are not very comfortable companions, and the fear that they might get so bad as to prevent me from riding, has depressed me a good deal. I know that in other ways I am much better than a year ago, but in the past three weeks, when the letting up of work has come, there has also come a letting down of spirits. The work now is not more than one third of what I do when decently busy, but I get very tired when evening comes. I am all played out." It is altogether probable that had not his active season been terminated so soon by the summer vacations, he would have gone on with his work and postponed the onset of his "fatigue" and the return of his annual attack of sciatica,—but doubtless with more serious consequences at a later day.

These cases show the three orders of symptoms, and represent later stages of the conditions noted in the two examples of evening fatigue illustrating the genesis of pathological fatigue. They bear also a curious resemblance to another very common experience:—An occasion of severe mental labor,—perhaps of night-work and little sleep,—is followed by a day of excitable alertness of mind and body; there is a sense of nervous strain, but with an undue mental facility and physical irritability. But after the next night's rest a sense of fatigue, languor, and *malaise* may

come—the second-day tire that leads to the inference of the elimination of an irritating stimulation revealing the real fatigue. In cases of neurasthenia, at more advanced stages, from long-standing or a more rapid development, the effects of habit upon the disordered physiological and mental activities become more pronounced. New symptoms also appear, due to greater changes in the nutritional processes, and particularly in the sensory mechanism.

The three orders of symptoms described refer to strictly mental phenomena and contain no mention of the irritability and languor common in this disease. These latter symptoms are both mental and physical, and they are direct manifestations of changes in bodily conditions. They now remain to be characterized as constituting a fourth order. We have therefore to examine further the subjective symptoms in respect to altered sensations. They include both those from the special senses and the largely predominating organic sensations. They may be distinguished as hyperæsthesia, paræsthesia and anæsthesia.

Hyperæsthesia may be held to include all the phenomena of excessive irritability. It may be sensory or motor, or central and mental. General morbid sensitiveness is manifested by "nervousness" and restlessness; the patients, especially women, have a sense of "tension" and difficulty of self-control. There may be irritative and neurasthenic conditions of all the organs and minor mechanisms. The local hyperæsthesias are very many—as of touch, in which however there is no real increase of delicacy, but almost always a diminution. In many cases the commonly unperceived organic sensations are intensified. The sense of pain belongs to this group of "common sensations," and they include the neuralgias along with which there may be a duller perception of tactile impressions. Itching, burning, and other conditions bordering on pain, are included in this group of sensations that differ from the tactile sense.

Sensitiveness to ordinary stimuli in the organs of special sense, particularly of sight and hearing, is common. The visual troubles are not very serious, but there is always some weakness and increased irritability. Reading causes fatigue and pain and leads to headache; and there is sensitiveness to light. Muscular insufficiencies occur. Visual memories are lessened. The hearing is over-sensitive in many cases, and the patient is very intolérant of slight noises. This may be due to the general mental irritability, and to expectant attention. These neurasthenic symptoms may be continued after recovery as the effects of mental habit. Hyperæsthesia may be regarded as the first degree of sensory disorder and weakening.

Paræsthesia, or perverted sensation, may be considered as representing a second degree of sensory disturbance and change from normal feeling, and may be general or local. Internally these disorders include giddiness, vertiginous sensations, a sense of muscular relaxation, etc. According to Gowers, the afferent impressions constantly passing to the cerebro-spinal centres, fail to affect consciousness under normal circumstances. But repeated attention may vastly increase the sensitiveness of the perceptive centres to such impressions, and from such increase arise sensations of great discomfort, sometimes amounting to pain. In the case of an intelligent lady whose conscientious efforts to disregard her ills stamped the description as genuine, there was, at times for many months, a feeling "like a stream of pounded glass running down the spine into the pelvic cavity." There may be perversions of the peripheral sensations, as pressure on the top of the head and of a band about it, a sense of expansion of the skull or as if it were empty. Feelings of flushing, both local and general, may occur, and numbness and coldness as alterations of the temperature sense, etc., in different parts of the body. This and the sense of pressure are to be distinguished as special functions, differing

from tactile sense. Creeping sensations, tinglings and formication, are common among the paræsthesias.

Anæsthesia is the final degree of changed sensations, and may be partial or complete. For example, numbness of the hands and feet is not uncommon; and there are limited anæsthesias of the tactile sense in various parts of the body, or this being retained, there may be analgesia as simply the loss of the sense of pain. The lowering of sensory activity in general, or diminished sensitiveness, has been observed. This is common enough to demand recognition as one of the characteristics of neurasthenia along with "excessive irritability;" in both alike there is probably a toxic influence, or its secondary effects. There may be limited areas of anæsthesia or hemi-anæsthesia, particularly in hysterical conditions, although "hysteria is essentially a mental disease involving the emotional faculties and the will."

The importance of these altered sensations is very great for their diagnostic value and as a guide to treatment in neurasthenia. Such disorders of the sensory apparatus of the special senses, as is well known, lead to the illusions and hallucinations, or disorders of sense-perception, in the graver degrees of the exhaustion of melancholia and mania. But the organic or common sensations are of fundamental importance, for, according to Ribot, "As the organism, so the personality." Taking the evidence of our bodily feelings, the sense of physical personality is the organized and coördinated sum of its elementary factors. Persisting alterations of organic sensations are aberrations of the physical personality, or as Bertrand calls them, "the hallucinations of the sense of the body." A man believes himself to be what he feels himself to be. He finds in the evidence furnished by the sum-total of his feelings the data for his judgments of himself. These sensorial alterations are doubtless expressions of more deeply seated disorder due to localized and limited derangements of the circulation. A

limited central exhaustion and excitation may be accompanied peripherally by vascular irritability and disturbance.

The relation of these altered sensations to their mental effects has been considered, and something has been said of the converse effects of mental states, as to the emotional tone and attention, upon the physiological activities. The mutual influence of mind and body upon each other is of great importance here, as to the causation of the conditions manifested by these changes in the organic sensations. Mosso has demonstrated that hyperæmia of the brain is coincident with mental work. It is physiological that centres becoming inactive resume a normal and comparatively anæmic state. The removal of the excess of waste that attends activity being accomplished by due periods of rest, the centres recover their normal condition, and work may be resumed on awaking from sleep. With over-work of the brain, and prolonged and probably localized hyperæmias, the exhausted vaso-motor apparatus becomes unable to control the blood-supply; local and relatively chronic hyperæmia in the over-exercised centres may follow and become pathological. In this state work may be continued by voluntary effort, but there is sleeplessness, and breaking down of the general health. The exhausted and poisoned brain, and nervous system generally, afford only a defective innervation to the various organs of the body; and the characteristic symptoms of dyspepsia, constipation, palpitation, and the like, appear, with all their sequelæ of altered sensations.

Macfarlane¹ describes the symptoms of this condition of neurasthenia as tolerably uniform,—sleeplessness being one of the most urgent, usually associated with throbbing blood-vessels and restless cerebration, dreams connected with the daily work, and the sleep obtained being disturbed and unrefreshing. The element of worry has been shown to be

¹ *Op. cit.*, pp. 78-82.

a prime factor in all these neurasthenic conditions. It is especially noteworthy that Macfarlane mentions certain symptoms of present interest,—they are the most prominent signs of the earlier alterations of cœnesthesis so well studied by Ribot. The former says, "Exhaustion and misery are felt in the morning; depression, despondency, and irritability during the day. All mental and physical work is accomplished with an effort, concentration of thought is difficult, and headache is seldom absent."

Two Special Conditions resulting from Changed Sensations.—The more greatly altered sensations, when localized and limited, may be estimated correctly, while the more general and pervading ones cannot be so well corrected. There are two prominent conditions due to changes in these general sensations that are of the highest clinical importance in neurasthenia.

The first of these conditions is "*morning depression*" or "*morning tire*." It is sometimes called "*morning misery*," but the tire is the essential fact. Both the mental feelings and the common sensations are altered by increase of intensity, and measurably represent the truth as to the bodily condition, although they still appear contradictory and lead to mental error. For example, a patient having fairly comfortable and cheerful feelings during the latter half of the day and in the evening, sleeps more or less well till the early hours of the morning. But on awaking he is in the depths of depression. Instead of being refreshed by sleep, all his feelings of inadequacy, misery and hopelessness are then at their keenest. The physical signs of exhaustion are more manifest. The patient feels added alarm because the sleep has not done him any good in the natural way. After breakfast he feels better, and by the middle of the forenoon his circulation is again active and steady and perhaps accelerated. The press of business and the daily interests are stimulating, and his nerve-cells, while probably giving

out as much as they are taking in of energy, are evidently better nourished than in the nocturnal condition of functional inactivity. This symptom is significant by its daily recurrence. It is among the leading ones of neurasthenia; and it may occur in all degrees, from the morning feelings of being unrefreshed, to a recurring sense of misery and despair that prompts to suicide. The physician should detect this symptom of morning tire and depression, which appears early in the disease, and should not be misled by the patient's evening sense of comfort. The morning more nearly represents his true condition.

This symptom of "morning tire" has long been observed in melancholia, but it is now being better explained as evidence of neurasthenia. The "mechanism" of these phenomena of "distressing awakening," is most complex and involves the problems of the physiology of sleep, the rhythm of nocturnal rest and relaxation and daily activity, and the "pathology of night," of which interesting studies are of late being made.¹ A valuable bibliography of the subject is given by Ch. Féré.² Broadbent³ says, "It is in the early morning that depression of spirits is liable to be at its worst in nervous debility, so called; or there is the morning headache which is relieved by the bath and breakfast, or wears off as the day advances; or the subject of this affection is more tired on waking up than on going to bed." Haig⁴ says he has "no difficulty in proving that it is just in these early morning hours that the excess of uric acid in the blood is greatest, and its effects on arterial tension most marked." Uric acidæmia in its relation to disorders of the circulation, and to irritability, languor, and depression, certainly invites careful inquiry.

The significance of these tired awakenings is very great,

¹ See Macfarlane, *Lancet*, Vol. I., 1891, p. 824.

² *Art. Pathology of Night.* *Brain*, Oct. 1889, p. 308.

³ *The Pulse*, p. 76.

⁴ *Loc. cit.*

as a symptom of morbid sleep which may be due to a variety of causes, involving particularly the weakness of functional power, through its exhaustion or annulment by toxic influences as in neurasthenia.

The other special condition is that of *anæsthesia of the sense of fatigue*. It results from altered organic sensations; and the truth as to the bodily state is obscured by the change or absence of certain data of sensation that go to make up a man's judgment of himself. The indications are paradoxical and misleading.

In the example of morning tire just mentioned the excessive work and worry might go on with increase of cerebral or general exhaustion; also the mental misery of the morning might be continued. Then a strange phenomenon may happen. The patient, who has before complained of his fatigue, now says he does not feel tired. He may have no definite sensations of inner discomfort from the dyspepsia, constipation, etc., although the general miserable feelings will continue with lessening or disappearance of the evening recuperation. Still, he claims that he is not tired,—that there is nothing the matter. His attention is more and more concentrated upon the objects that have habitually interested him, or upon his morbid ideas, with lessening power to turn from them. Thus the process goes on in its vicious train.

This is one of the commonest of all symptoms, and often appears early and in slight degrees. It represents the descent of the patient's condition towards the depths of nervous exhaustion, and to a point where the sensory power itself is materially lessened. The patient, previously guided by the sense of fatigue in desisting from effort, has now lost his guide,—his natural feeling. He cannot believe his physician or his friends that he is over-tired. He is conscious of inefficiency, mental and physical; and he feels added self-reproach because he cannot accomplish what he ought

when he does not feel sufficiently ill or fatigued to justify relaxation from duties that are pressing, or seem so to him. The stimulation of change, travel, etc., is often prescribed when there is this fictitious appearance of the patient's ability to bear it. Tired women will carry on their domestic duties by "working on their nerves," or walk for miles without natural fatigue, seeking health in "exercise" when it is most damaging. This symptom comes out most clearly in cases that have advanced to melancholia, but it is a true index of the neurasthenic state in all its stages, and has its lesser forms in many of the milder cases. In the extreme cases the lifting up of such patients from the depths of exhaustion is a most interesting process to watch, when they "come to the sense of feeling." If previously agitated, restless and apparently unfatigued, they grow more quiet,—sometimes they take to their beds with a profound sense of weakness. They say they feel worse, and are alarmed as well as their friends; but they are really better. This is a distinct stage in the upward progress toward recovery.

The conditions of melancholia, in its most neurasthenic stages, are among those in which this symptom of change of the sensations that go to make up the sense of fatigue is most plainly declared. In one class of cases there are the conditions of diminished sensitiveness, dulness or languor, affecting in different degrees both sensory and mental activities even to the degree of apparent or real stupor, in which the motor paresis is so striking a symptom. There is in these cases a manifest consistency in the presence of a blunting effect upon the sense of fatigue. It seems consistent enough also in that class of cases in which there are the associated symptoms of mental agitation, irritability and restlessness as manifestations of hyperæsthesia, that are continually prompting the patient to motor activity,—just as analgesia may exist with a hyperæsthesia which itself is attended by a diminution in delicacy of touch. It is of

course true that the attention plays its part in the matter,—the attention being occupied by intensified ideas and emotions either of pleasure or of pain, there may be, for the time, an unconsciousness of the sense of fatigue that might be felt if attended to ; so it is in hypnotism, or when contusions are not perceived in a foot-ball scrimmage, or even fatal wounds in battle by men who live long enough to tell of them. But this fact does not militate against the validity of clinical observations and confessed experiences in the cases of many intelligent patients in whom the condition is of long continuance. In the extreme cases of agitation and restlessness, as is well known, the patients will walk and walk by the hour, sleep fitfully, turn in their beds or leave them many times, often restlessly changing their positions by day and by night. Like symptoms of restlessness are observed also in many cases of neurasthenia without the mental symptoms requisite for a diagnosis of melancholia, but both these classes of patients often declare the absence or blunting of the sense of fatigue. It should be understood that these references are made to melancholia because it presents this symptom in so pronounced a way as to reveal its importance, and something of its nature ; its recognition in its lesser manifestations in neurasthenia thus becomes easier.

This phenomenon appears in cases presenting such early stages as those described to illustrate the genesis of pathological fatigue. There is evidence of this peculiar symptom in the graphic statement, quoted from the physician who felt excessive tire and the "letting down of spirits" as soon as his work was reduced to one half of that he had just previously been doing. All the conditions of the "fatigue" were undoubtedly present before the "letting up of work" in which the exciting stimulation to activity possibly created peculiar toxic products which obscured the real condition. At all events, in such conditions as these and the equally common experience of the "second-day tire," there is that

state of pathological fatigue which is marked by a notable absence of a due sense of tire. It is certainly obvious, as a physiological fact, and as a clinical observation, as in the illustrative cases, that the degree of bodily and mental fatigue is not measured by the feeling of it. It is one of the most familiar of all familiar facts that men and women are continually over-doing themselves without knowing it. When a condition of pathological fatigue is established, this anæsthesia of the sense of fatigue, in some degree, becomes a part of the general condition. It is important to recognize it,—to give it a name,—to teach the patient to understand it,—and then its great value as a diagnostic guide to treatment will appear. Knowledge of it also has often the happiest effect upon the patient in gaining that condition which Mitchell sought before the rest treatment could be begun,—“the absence of thought with the friction of worry which injures.” The patient being at fault in attempting to judge of himself by his altered and blunted sensations, is always alarmed at the mystery of his anomalous and contradictory feelings. With the feeling of inadequacy from a sense of abated motor power there is exhaustion also of sensory power. An intelligent patient always understands when told that there is tire, not only in the power to do things, but in the power to feel the tire. An apparent mystery is readily cleared up by this explanation, because it so fits the facts of the patient's experience. Then he can see the force of the rule that he must limit his exercise by quantity and time, and not by feeling.

In the wide range of conditions from the milder to the severer stages, they are constantly presenting paradoxical phenomena, as they may well do, when the one neurasthenic cause is the basis alike for anæsthesia and hyperæsthesia and all their attendant trains of symptoms which are apparently so contradictory. Not in all cases does this anæsthesia of the sense of fatigue appear, nor always in like associations

with other symptoms. There are different classes of cases also according to temperament, character, and habit. Women with the "New-England conscience" need always to be held back against over-effort, and too early effort in all stages of the disease, particularly of convalescence. Whether or not in the course of the neurasthenia there has been a middle period of melancholia, or the like, the principle is always the same. Then in such cases, in the condition of relative comfort and exhilaration which makes the delight of the period of convalescence, there is always danger of over-exertion. The sense of fatigue not being fully recovered, it is at one time felt and again lost, as a sequence of some indiscretion in exercise—some over-stimulation of emotion, either pleasurable or painful. This is the time for the greatest caution. But when at last the patient feels naturally tired, even though upon moderate effort, and can appreciate the restfulness of repose, then is convalescence assured if conducted with care within the limits of the recovered energy.

This analysis and estimate of the clinical manifestations of neurasthenia go to show how gravely significant and dangerous is the condition which is represented by the symptom of diminished sensitiveness, or anæsthesia of the sense of fatigue. Immediately concurrent with the induction of pathological fatigue, with its dual elements of diminished energy and auto-intoxication, almost the very first effect of these is to begin the annulment of the sense that prompts to the conservation of nervous energy. When this peculiar and very common effect is produced, the greater the exhaustion the less the direct sense of it through the normal channels. The patient vaguely feels a lessened adequacy to effort of body or mind,—a lowering of the emotional tone,—many sensations of misery as emphasized in the morning tire,—much irritability and restlessness,—and all the changes characterized as hyperæs-

thesia, paræsthesia and anæsthesia ; in like manner there is alteration of the sense of fatigue, in some of its complex elements.

There is another class of cases in sharp contrast with the type just described. They have usually been long ill and have developed secondary conditions. Rest being at last enforced, by the completeness of the break-down, or becoming a habit by indulgence, the rest treatment is sometimes carried too far, probably, beyond the point where exercise should begin. This is a point difficult to determine, but the positive gaining of weight is a good guide. But in the condition of the prolonged "bed-cases," or in the relapsing cases, there is likely to come, when they grow fat and when they do not, a state in which fatigue is keenly felt. As an extreme manifestation of this is the inability to sit upright, to hear reading or talking, etc. ; even the slightest muscular exertion, as the raising of an arm, is distressing, and there is great sensitiveness to sound or light. There is not only "horrible depression" upon slight exertion, but a "terrible exhaustion." The quickened pulse, palpitation, change in color, etc., are physical signs in proof of great weakness in such cases. This appears, indeed, like hyperæsthesia of the sense of fatigue in some of its complex elements : but when these cases are led to convalescence, it is long before the natural sense of fatigue, and resistance to its quick disturbance, is recovered. With the dyspeptic aversion to food, the weakened power of assimilation of what is taken, the discouragement of many relapses, and all the effects of habit, these cases are difficult enough.

The mechanism of the sense of fatigue is obscure, as is the complexity of its origin. The difficulty of distinguishing between the central nervous fatigue and the peripheral fatigue of muscles has been noted. The central sense of innervation, and of the need of increasing effort with the

increasing fatigue, would seem to be necessarily an element in it. But this very mental activity of brain cells is assumed to yield, along with waste products and work, the organic sensations of fatigue. Again, the same is true of the muscular sense, or sense of weight, as affording sensations of work being done, of exhausted energy, or of disability of contractile power. But the muscular sense is said to belong rather to the special senses, and we see it still acting normally in the cases of pronounced fatigue-anæsthesia, when there is no marked ataxic change of muscular coördination, even in very restless and irritable cases. Is it, indeed, but a question of the degree of alteration of the muscular sense? With doses of alcohol, ether, and the like, we may first blunt the sense of fatigue, then more and more the sense of weight, even to its annulment as the necessary element in coördination of muscular movement, and the result may be the ataxy of intoxication. In the transitions between these first and last stages of changed sensations, as the effect of one and the same poison, does the common phenomenon of the anæsthesia of the sense of fatigue in neurasthenia represent but a first stage, as a peculiar effect of some special poisoning? We have not as yet, in the study of these pathological conditions, the data of experimental study to demonstrate the mechanism of this symptom. But we have certainly the final fact of its clinical manifestation, and it stands the test of the practical application of this explanation of it.

With this additional study of these alterations of organic sensations, the way is prepared for a characterization of them in a summing up of the symptoms of neurasthenia. Three orders of these symptoms have been set down; the fourth should therefore include those relating to the alterations of sensitiveness, both in the direction of anæsthesia and hyperæsthesia, and should present the conclusions drawn from this last analysis and estimate of them. The following statement, then, is meant to include, in their four orders,

The Subjective Symptoms of Neurasthenia.

1. Depression of spirits,—lowering of the emotional tone and a sense of ill-being.
2. Decrease of the power of attention (reflex attention), and sometimes of memory.¹
3. Morbid introspection, retrospection and apprehension (worry, hypochondria).
4. Diminished sensitiveness, dulness and languor (anæsthesia) ; irritability and restlessness (hyperæsthesia).

These minor orders of symptoms go to make up a symptom-group that forms a clinical picture of neurasthenia, covering the elements of many possible variations of its forms. The sources and mechanism of each order of symptoms have been studied, and this should furnish the data for a precise definition of the disease. That of Dana has already been amended, in these pages, to include the element of languor that represents the fundamental element of toxic blunting of sensitiveness ; and while this, and the specification of excessive weakness and irritability, imply a mental element, the prime importance of this, as early recognized by Beard and Mitchell, is not adequately noted. On the basis of the foregoing summary of symptoms the amended definition may be written as follows:—*Neurasthenia is a morbid condition of the nervous system, and its underlying characteristics are excessive weakness, and irritability or languor, with mental depression and weakened attention.*

Diagnosis.—Neurasthenia being regarded as a condition of the nervous system, manifested by functional disorder and without structural changes being as yet demonstrable, and presenting symptoms of so many variable phases, its determination as a disease is peculiarly limited to the method of exclusion. It is not only a direct result of stress and wear on the one hand, but it is so constantly secondary to debilitating influences of all kinds,—the “general debility” of our fathers in medicine,—that it has often to be differen-

¹ See Notes, p. 103.

tiated as being the remote and not the immediate effect or symptom of some antecedent disease. In other words such a disease may pass away and leave the nervous symptoms to continue as if somewhat by habit. On the other hand, it is the initial condition and often the sole basis of a great variety of symptom-groups, which are framed into pictures of "clinical entities"; it must therefore be differentiated from those disorders of the nervous system in which something has been added to the simple neurasthenia, of graver functional disturbance and perhaps of definite structural change.

Neurasthenia often stands as a middle term between general etiological conditions and nervous disorders. It simplifies and clarifies the view, to regard neurasthenia as the common etiological and initial term to many varieties of symptom-groups, and even of definite nervous diseases, about which there is so much confusion as to their etiology. This is peculiarly true of mental diseases with which we cannot yet get beyond a classification of symptom-groups.

The nutrition of nerve-cells being primarily at fault, toxic influences being always primarily present, central disorder of the nervous system being usually manifested by the earliest symptoms, and cerebral exhaustion through mental strain being one of the most common forms, the diagnosis must often be made solely upon the subjective and mental signs. This may be done early enough for prophylaxis in many cases. Any notable and persistent alteration from the natural manner and appearance, indicating a lowering of the emotional tone, in persons otherwise in apparent good health, suggests inquiry as to the cause of the abatement of natural vivacity and the lack of the usual mental control manifested by unwonted irritability of temper which may be confessed. These premonitory indications are of the most practical value. Active professional and business men who do much brain-work and incline

to sedentary habits, women under a monotonous strain of domestic life or subjected to special mental anxiety and grief, or the indolent who suffer especially from functional disuse and defective elimination, all, at times, are likely to experience these mental signs of "fatigue" and toxicity. The primary order of symptoms being present, and the causes continuing, some of those of the other three orders that have been specified will soon be manifest in some slight degree, and be more or less slowly developed. The study of the genesis of these subjective symptoms and their nature as summed up in the foregoing section, may serve to show how their natural order of development affords a method of analysis that is an aid to diagnosis.

Neurasthenia should first be differentiated from the antecedent conditions, with a discrimination of its immediate and remote causes. This demands a determination, as far as possible, of the nature of the inanition and the auto-intoxication, whether partial or general,—and, otherwise, the study of the "mechanism" of the symptoms. This implies, at the outset, a careful study of all the objective symptoms by the usual methods of diagnosis. Their character as due to neuroses must be established as at least probable, to the exclusion of organic diseases of the nervous system, although these may still have a neurasthenic basis that is amenable to treatment. The inquiry is then led into the central "weakness," the diagnosis of which points out the need of general treatment rather than of medication for the localized disorders. The objective items of the most practical diagnostic importance in this regard are of two classes, and pertain to the elimination of toxic waste products, and to the processes of repair by nutrition and tonic influences.

The way is now clear for a further differentiation of the subjective or mental symptoms to determine the diagnosis and prognosis with respect to melancholia. It must be

remembered that many cases of melancholia have no more than the four orders of symptoms,—no delusions, and no essential impairment of integrity of the reasoning power;—it is a question of degree. On the other hand, very pronounced manifestations of these orders of symptoms, more than in some of the cases of melancholia, will not truly bear that diagnosis, although the underlying organic conditions are of the same nature in both these types of cases. Difficult as it is to draw the line between “nervous prostration” and melancholia, the crucial test may perhaps be best stated as a question of the degree of impairment of the higher power of inhibitory control,—the weakening of the voluntary power exercised through the attention. There may come a time in these conditions when painful ideas become so dominant, because of the inability to inhibit them, as to endanger the patient by promptings to suicide. Then we say, it is melancholia, and that there must be medical restraint. But in many cases the true conditions of melancholia are established before this symptom comes. It is a matter of temperament, education, training, “habits of thought,”—there are those nobler souls who withstand to the last degree the nervous exhaustion, the misery of mental pain, and the terrible temptation to seek relief through “the open door.” But many are weak in will and inhibition, and yield early to specious reasoning and the bias of the emotional tone, for whom recovery would be as sure as from other forms of functional weakness. But this bias of emotional tone, which more or less influences all alike, may depend exactly upon those alterations of the “sense of body” which annul the instinctive love of life, thus technically establishing the diagnosis of melancholia. The differential diagnosis of neurasthenia and melancholia, then, depends upon an estimate of the degree of nervous exhaustion with reference to the mental symptoms, particularly as to depression of feeling and weakened inhibition. This estimate

must include a judgment of the individual as to character and of the probable continuance or increase of the alterations in the organic sensations as affecting the natural instinct of self-preservation. Such alterations become the basis of a fifth order of symptoms which complete the symptom-group that constitutes a typical melancholia.¹

The physical or objective signs do not afford a good differential guide as between neurasthenia and melancholia. The latter may exist without more pronounced symptoms of general debility, disorders of digestion, etc., than are common to neurasthenia, although they are often seen in melancholia, as anæmia, a sub-normal temperature, and a urine which may be scanty and condensed, etc., which suggests special study as to its indications of deficient elimination.

The two special conditions of morning tire and anæsthesia of the sense of fatigue have been described as of the highest diagnostic value in respect to the neurasthenic condition. They do not afford differential indications, however, except that these symptoms are usually more pronounced in melancholia. It should be noted that morning tire is common as a transient symptom after excesses in dissipation or in over-work, but it becomes significant in neurasthenia by its more or less persistent recurrence.¹

Hypochondria may be differentiated as being subject to the principles just stated in so far as that it is a milder, or a sub-acute, melancholia, in which the patient has peculiar worries over his own bodily ills.

Insistent or fixed ideas may or may not be diagnostic of neurasthenia. They are common in melancholia, mania, etc., in the genesis of delusions, and may continue as sequels of such mental storms through the effects of mental habit and association of ideas, etc. While they are more likely to occur in neurasthenia, and thus become a symptom of it, they are sometimes initiated in persons constitutionally

¹ See Notes, p. 105.

sound and become the cause of neurasthenia by the worry that may attend them. They may directly initiate it, in fact, as a neurasthenic weakening of inhibition, and in some limited disorder of physiological processes as an association psycho-neurosis. The correct diagnosis of these ideational disorders is important and valuable as affording indications for prognosis and treatment. Hysteria as allied to these affections often has a neurasthenic basis and appears as a complication; and it is peculiarly characterized by the anæsthesias of the special senses.

Treatment.—The diagnosis of the neurasthenic condition having been made, upon a physical and mental examination that for special reasons should be thorough in all particulars, the plan of treatment should be carefully laid out. The objective indications will be first considered.

Elimination of waste products is logically a prime element of the treatment. Not only should the alimentary canal be regularly and thoroughly evacuated, and the work of the kidneys be efficient, but the removal of the accumulations of toxic materials stored up in the tissues should be aided. Constipation from intestinal atony, as a frequent symptom of neurasthenia, will itself directly cause nervous irritability, depression, etc., and the functions of the various organs will be generally impaired. This demands a proper regulation of the bowels; and all means should be tried before regularly resorting to laxatives,—but they must be used if needed. The milder ones, like compound licorice powder, may be used at first, or the compound rhubarb or cathartic pills. But a cholagogue purgative has often an excellent effect,—one-sixth grain doses of calomel every hour or half hour,—or five grains of grey powder every hour until action occurs,—or a few doses thus given followed by a saline laxative. A glass of cold or hot water, with perhaps some saline like Carlsbad salts, may be taken at bed-time or in the morning; the hot water especially has

a washing-out effect upon the upper part of the intestinal tract, and acts as a solvent upon the contents of the intestines. Brunton¹ says that many cases of nervous irritability, depression and weakness appear like neurasthenia and hypochondria. Nervine tonics, sedatives, etc., are not needed; but for good results you must treat the bowels. Massage of the abdomen is useful, and small enemata of plain warm water, the rule being observed to solicit action at a certain hour every day. Fruit should be taken freely, and a good proportion of solid food when possible. Minute doses of aloin and strychnia, or one-tenth of a grain of aloin alone, or one or two grains of extract of cascara sagrada,² regularly after each meal, have a gentle and excellent effect; the morning doses and later those at noon, may be omitted as the patient improves. But the practical rule must be to give what suits the patient in each case.

Elimination by the kidneys is of the first importance. In cases of neurasthenia it is commonly found that the patients drink too little water, which is the best diluent and diuretic. Prescribe pure spring or distilled waters, which may be aerated,—not too much at meals, but between them or half an hour before; this should be done particularly when the urine is scanty and of high specific gravity. As Brunton says, it “tends to wash away the waste products from the cells of which our organs are composed, to clear out the uric acid, urea, and phosphates through our kidneys and thus prevent renal and vesical calculi, and also to wash out our liver and prevent gall-stones, while it helps to keep the bowels in action.” In prescribing the daily consumption of hot water, a slice of lemon in it may overcome the dislike of it. A part of the beneficial effect of milk is doubtless due to increased ingestion of the water it contains, and milk and lime water, or soda-water, may be given to the same

¹ Lancet, June 20, 1891, p. 1365.

² This drug will be disappointing if it is not the product of the well-selected and matured plant, and reliably prepared.

effect. Skim milk and whey are good diluents, and best suit some conditions of digestion.

Brunton regards the views of Haig, as to the elimination of uric acid, as an important contribution to our knowledge of the subject. These views have already been quoted, to the effect that the production of an excess of uric acid in the body is due to its deficient elimination in the urine; Haig says also that "it may be looked upon as going on to some extent in every one during the best years of nutrition and bodily activity," tending to its accumulation in the tissues. Uric acidæmia is therefore regarded by him and others as a condition that may ordinarily occur apart from the gouty diathesis, and be a source of much nervous disorder, including the feelings of depression, heaviness, drowsiness after meals, disinclination for bodily and mental exertion, sleeplessness, etc., which are the symptoms common to neurasthenia. The periodical attacks of headache, mental depression, etc., are thus accounted for in young people whose storage is less of uric acid, and the indication for treatment is a change from nitrogenous to farinaceous food. The persistence of these mental symptoms in older people indicates the probable need of clearing out the accumulation of uric acid in the tissues, spleen, liver, etc. The taking of alkalies according to the plan of treatment recommended, and the disorders of nutrition, etc., that increase the alkalinity of the blood, make it a solvent of the stored uric acid; this will cause acidæmia, with a relatively slow, high-tension pulse, and the usually accompanying symptoms. It is greatest after meals and in the morning hours before and after breakfast, during the "alkaline tide" of the blood. Coincident with this is the "morning tire," as has been stated. But if acids are given, wines or condiments containing them, or opium and other drugs that act like them, —as *nux vomica*, iron, nitro-glycerine, nitrite of amyl,—the uric acid is driven out of the blood into the tissues,

relaxing arterioles by reducing tension, and improving the circulation. Mercury by a like action reduces the excretion of uric acid in urine, producing diuresis. All this is to the temporary relief of the disturbing symptoms, but it is not elimination and they tend to return in a worse degree. If there are exacerbations of headache, with nausea, etc.,—for example, a "bilious attack,"—give aromatic spirits of ammonia or nux vomica in place of acids; or, when acids fail, opium or mercury in small doses will sometimes succeed in affording the temporary relief then essential. Elimination is probably best effected by a course of salicylate of soda, with an acid mixture in alternate doses for weeks or months, till the daily excretion of uric acid remains for some time at the level of normal formation (1–33) as to urea; at the same time there should be as little of nitrogenous food as is compatible with healthy nutrition. The effect is to remove the cause of the irritative vascular disturbance. Then dieting is the main reliance, to limit the formation and retention of uric acid. Haig recognized the fact that when the nervous system is depressed by fatigue, deficient food, etc., disturbance of function will be produced by a smaller amount of uric acid in the blood than at other times. It is significant that these symptoms, common to neurasthenia and melancholia, are often observed in the latter to be ameliorated along with the return of normal excretion by the kidneys. Reference has been made to Brunton's conjecture that oxaluria indicates the presence of some special poison in the blood. Cases with this symptom are commonly treated in the asylums with nitro-muriatic acid; Wood¹ reports some interesting cases of impending melancholia successfully treated in this way. Such considerations give new interest to the physiological processes of elimination, and enlarge a special field for investigation into the causes and treatment of the nutritional disorders of neurasthenia.

The excretory action of the skin should receive attention, and it is promoted by bathing and bodily exercise. The neurasthenic do not bear cold bathing well, and its effect upon those who have previously used it to advantage should be observed. The effects of the warm bath should be noted while it is being taken, and afterwards, so that its temperature and duration may be regulated to suit the patient. Tepid and warm baths at night have a sedative and hypnotic effect also, and may be employed two or three times a week, oftener when well borne. The Turkish bath when judiciously given is useful in some such cases. The morning sponging with cool water, not more than 20° F. below the temperature of the skin, should be regularly practised. It should be given by the nurse until the patient is strong enough not to need assistance,—then the muscular effort is good in addition to the effect of the rubbing with a coarse towel, which should always follow the bath. At first the temperature of the water may be such as to give only a slight sense of coolness, and later it may gradually be made cooler. The patient should never feel cold or weak after the bath; the test of its being beneficial is the sense of warmth and comfort, or invigoration that it gives. The sitz bath and foot bath have their special indications. Sea-bathing on the northern New-England coast is not beneficial to those who are much advanced in neurasthenia; in warmer waters it is often invigorating and useful, and should bear the test of the after-effects.

Menstrual irregularities are often neurasthenic and should be carefully observed and treated, though rarely by drugs. The douche may be used, when indicated, under ordinary rules. Suspension of the flow may be looked upon as conservative. An ordinary flow for the individual is often relatively too much, and should be limited. The patient usually has aggravation of nervous discomfort or severer symptoms at such times, and should be kept in bed from

the beginning of the flow, or the day before, until one or more days after. Fluid extract of ergot has sometimes an excellent effect, in five to ten drop doses, three times daily, for two weeks before the event, or all the month. It regulates as well as diminishes the flow. Large hot douches, twice daily, when it is desired to arrest it after one or two days, have been employed with great advantage. Two to four such douches are usually sufficient.

Nutrition as the main element of the process of repair demands careful attention. All the food should be given that the digestive powers will bear, it being remembered that they are weakened with the other functions. Easily digested articles may be required for a time, but avoid slops if the patient can possibly take solid food. Ignore a little dyspepsia as not always requiring drugs; it will disappear as the patient gains in strength. Milk, fish, eggs, vegetables, fruit in abundance, and farinaceous articles, are the main reliance, noting any special difficulty there be in the digestion of starchy foods.

A variety of plain meats is not contra-indicated, except that nitrogenous articles should be limited in the treatment of uric acidæmia. Haig mentions that Lange successfully treated certain conditions of periodical depression from this cause by a diminution of meat foods, etc.; and Broadbent used the milk diet with success in the frequent association of mental depression with high tension of the pulse. Sugar and starch must sometimes be avoided; give cream, malt, etc., and good butter may be freely used, when increase of weight is indicated; weigh the patient regularly, every month at least. A table-spoonful of malt and the same of whiskey or rum in milk, is a good addition to the light meal that must be taken when there is much acid dyspepsia. One half drachm doses of aromatic spirits of ammonia, at each meal, are useful in this condition.

Give soups, and prescribe water for its value in nutri-

tional processes, as well as a diluent and diuretic. Milk, eggs, good beef tea, porridges of Mellin's Food, with the addition of peptonized beef-powder, etc., afford a variety for luncheons between meals and at bed-time. In the long interval between this and breakfast, especially when the patient is wakeful by night, a glass of milk or the like, and better if warmed, is most useful in anticipation of the morning tire. This significant symptom of neurasthenia is an important index also for general treatment. For this condition give on awaking a glass of warm beef tea, or of milk with a spoonful of whiskey or rum, and it will lessen the "misery." As a rule, however, stimulants should be but little used. In the weaker cases, with much dyspeptic disorder, the regular milk-diet, as much as can be borne, and frequent feeding, may be employed along with the "rest-treatment." At the beginning of the treatment a precise plan of dieting should be written out, with the prescription for each of the fixed hours for meals. Require the nurse, if there is one, to keep an exact record of what is taken, along with the clinical chart and other notes.

Rest, as a prime requisite, should be at first absolute and continuous, or partial. The first is appropriate when there is general exhaustion, or conditions of body that admit of it as an aid in improving the general nutrition for the relief of local neurasthenia. It is contra-indicated in the graver degrees of depression, and especially of irritable restlessness and agitation. Then it must be modified, and some degree of partial rest may be employed. The point is to get as much rest as possible for the patient, until he has acquired some storage of energy, to permit of its use within physiological limits, and to relieve the distressing sensations that are the basis of the lowered emotional tone. Get all the rest possible without increasing the irritation. In some cases the regulation time of six weeks is enough for the absolute rest; sometimes many months of partial rest are

required. There seems to be no rule except careful trial. In the bed-cases the time seems to be indicated by a positive gain in weight and improved quietude of feeling; then it may be necessary that exercise should be urged upon the patient.

Exercise, properly regulated, is essential; it should be begun gently and increased gradually in all cases; in the severer ones the patients may get up first in the afternoon, then after a time in the forenoon, but should be kept in bed till after breakfast for a long time. Get them out of doors daily for fresh air and moderate exercise. This is the plan for partial rest to which cases of pronounced depression and restlessness should be subjected as far as practicable. When the irritability is great, permit them to get up occasionally, to lie on a couch, etc., but promote resting in any way it can be gained. *Exercise should always be kept within the limits of fatigue,—this is the golden rule of neurasthenia.* Macfarlane well says that fatigue invariably intensifies the symptoms, whatever the limit may be; and this must be determined for every individual case.

The guides to the limit of fatigue are most obscure. It has been seen that the feeling of it does not measure it in the well, and that in the weak one of the most important facts in the disorders of the "sense of body" is what may be called anæsthesia of the sense of fatigue. There is no escape from the logic of this condition,—the patient's appreciation of it must always be *interpreted* by the physician, who must also study all the signs of fatigue and *direct* the patient as to the kind and amount of exercise. The effect of this, upon pulse and temperature, for example, should be watched. When the temperature is sub-normal, the conditions of elimination, nutrition and rest should be carefully maintained. Then even a little exercise often seems to increase the irritability; but when the temperature becomes

normal more exercise can usually be borne without this effect, in the more acute stages of neurasthenia. In cases of long standing or partial recovery, of the irritable and ambitious or conscientious type, great depression and a sense of "terrible exhaustion" may follow as a reaction from indiscretion in exercise; this may be prompted by a period of comfort when the sense of fatigue may have been quite reliable as a guide within the narrow limits of much repose and gentle effort, but it is quickly lost under a little stimulation or excitement. Such a patient may astonish and mystify all concerned by extraordinary displays of apparent endurance, but it has to be "paid for" with the repentance that comes with the exhausting reaction that may amount to a true relapse. These effects not being appreciated by the patient as simple signs of fatigue, the "repentance" is quite sure to take the form of renewed and intensified self-reproach, with all its harmful effects.

The careful prescription of exercise is one of the most important duties of the physician in these cases. Within due limits it increases vigor by the law of physiological use. It quickens digestive processes and excites the appetite, and promotes sleep. He must "follow up" his patient and protect him in this particular, until he has acquired a sufficient reserve of energy, and a sufficiently normal "sense of body" to be his own guide. If the physician does not do this he will surely let his patient suffer painful relapses which too often occur in spite of all advice. For patients having cerebral exhaustion, though bodily well nourished, and with effects of sedentary habits, exercise should be coupled with efficient elimination, but it should be remembered that there is also increased central fatigue with all voluntary muscular effort. This must be carefully limited at first, in these as in other cases, while reasonable entertainment is a necessity.

Massage counteracts the tendency to enfeeblement from prolonged rest,—it affords exercise without the expenditure

of energy by the patient,—it promotes the removal of the toxic and waste materials from the tissues, and their healthy nutrition. It must be managed with care and not be too long continued, but may be followed by medical or general gymnastics of the gentler kinds, or other voluntary muscular exertion, to the extent to which the patient bears it without aggravation of the neurasthenic symptoms. Electrical treatment has been much commended both for its sedative and stimulant effects, in the forms of central galvanization or general faradization; the functions generally improve under its tonic influence. It may be employed for a few weeks every other day. It often has a mental effect.

Sleep should be promoted with as little use of hypnotics as possible. They tend to spoil the appetite and to produce secondary effects. Toxic quietude of brain cells may not promote their rest and nutrition. In the diverse causation of neurasthenia the conditions inducing insomnia are varied. Its cause should be determined, in each case, as nearly as possible. There may be some special toxic influence, errors of diet, too much mental work and too little bodily exercise, the rheumatic or gouty diathesis, etc. While the blood tension is usually low in anæmic conditions, it is again high, and a few minute doses of calomel at night with alkalies during the day, are indicated. Sleeplessness from physical over-fatigue, may be relieved by the wet pack, a warm bath, or massage, with some liquid nourishment in moderate quantity,—with a little wine or brandy and a biscuit.¹ If the patient must have something for a hypnotic, do the least harm possible. In such cases Folsom² uses preferably an unpleasant drug,—a few minims of paraldehyde in a drachm of chloroform water, and this can be repeated a number of times. This drug is a safe one in drachm doses, when it can be taken; and a second dose

¹ Macfarlane, op. cit., p. 118.

² Bost. Med. and Surg. Journal, July 10, 1890, p. 29.

may be given after two or three hours; peppermint water is a good vehicle for it. Sulfonal is, at present, to be regarded as one of the safest hypnotics. Begin with ten or fifteen grains, and when its cumulative effect is gained, reduce it to ten or seven grains; it should be pulverized and given in a moistened spoon, one and a half hours before its effect is expected. Phenacetine, five or ten grains, two or three times daily, is sometimes a good adjunct when there is nervous distress and restlessness; or it may be repeated every hour, or half hour, till twenty or thirty grains are given, for the relief of pain. Warm baths and night feeding are very effective in the long run. Most patients who lie much in bed can get on with comparatively little sleep. It is better to go without as much as is desired, or wait for it to come, rather than to create a drug habit. Two or three hours each night will do very well for a considerable time in such cases. Beware of using the bromides and chloral continuously. Patients are sometimes brought to the asylums in toxic conditions from these drugs, or from paraldehyde. The first may be given moderately for a short time only,—not more than one week. Iron and other tonics that improve the appetite may be given when well borne. Aromatic spirits of ammonia in half drachm doses may be used frequently and safely in paroxysmal nervousness.

The *subjective* and mental symptoms, in relation to treatment, demand the special attention that their importance in diagnosis indicates. In studying the objective symptoms, a general though brief review was made of the measures ordinarily regarded as therapeutic. This included not only the physical signs, but necessarily also that group of coincident subjective indications of which we can only know by what the patient says of his bodily condition; his appreciation of it may be mainly correct and corroborative of the physician's observations, or be interpreted as consistent with them. This includes the *inward* reactions, or *negative*

symptoms of the physical disorder, according to Putnam¹, distinguishing them from the *positive* or objective signs.

But we have seen how the normally correct appreciation of the "sense of body" is qualified in the well; and how with the onset and increase of pathological "fatigue" there is an increasing impairment of appreciation, requiring interpretation by the physician. We have seen also how the impaired and altered "sense of body," and special senses as well, in respect to the group of subjective symptoms just mentioned, affect the strictly mental indications. All can agree as to the symptoms of neurasthenia being mainly subjective; and as to the fundamental facts of irritability and languor in mind and body,—and of mental depression and weakened control. Our study of the mechanism of these alterations of mental activity leads us to see clearly the significance of such effects, and that "the higher mental states are the sensitive indices of the lower physical changes," affording us the truest guides to diagnosis and the need of treatment.

The subjective symptoms, with a correct interpretation of mental states, are the chief guides to diagnosis and treatment. They give the earlier and finer indications, for they always exist when there is neurasthenia; they are often present, and complained of, when there are no clear objective signs. The paramount importance of the mental condition becomes plain because it has to be treated from first to last; there is often no guide but this. Even when all objective signs have for some time disappeared, there can be no assurance of recovery until the patient can say that there is permanent freedom from the depression, irritability, or languor of feeling, and that he has acquired the power to control his own mind, and his natural force is not abated. The most critical periods of the progress towards recovery, when the danger of relapse is greatest, are when the only

¹ J. J. Putnam. Art. Neurasthenia, Ref. Handb. of Med. Sc.

guides to the limits of fatigue are the subjective and mental symptoms,—what the patient feels and thinks as to his own condition. But that itself does not guide,—it is continually leading astray the patient and often the physician. The true guide is to know what it is that makes the patient feel and think as he does. It is upon the correct interpretation of the mental signs that successful treatment largely depends.

A correct knowledge of the working of the mental elements is essential to put the physician into a proper and controlling relation to the case. The very first indication for treatment is that the confidence of the patient should be gained as soon as possible. This is aided by the careful examination, that should always be made, in every particular, bodily and mental, that is needed to establish the diagnosis. It is then important to give the patient a clear understanding of the nature of the malady. Intelligent patients are always very ready to accept correct explanations of their condition and experiences, and it is often most satisfactory to them to know, for example, the reason for the morning tire, and to understand the principle of anæsthesia of the sense of fatigue. They know what it is to be too tired to feel fatigued. The first thing is, therefore, to know what is the matter, and then to get the patient to know it; this gains the willing and intelligent coöperation of the invalid,—relieves greatly the worry,—and thus directly promotes repose and the arrest of exhausting processes both in body and mind. All writers agree as to the importance of gaining such coöperation, and advise careful attention to this part of the treatment of such cases.

When the physician thus appeals to the understanding and interest of his patient, he addresses himself exactly to the moulding of the mental elements that are involved in the malady,—he sets himself, at the outset, to treat the symptoms that all observers note as among the earliest to appear.

The first clinical procedure, then, with which the treatment is begun, is to get the whole story of the patient's experiences with reference to the symptoms, as soon as practicable. When neurasthenic patients come to the physician, they have usually made a number of attempts at "resting," and have suffered as many relapses because the golden rule of keeping within the limits of fatigue was not followed to the completion of convalescence. The patient comes because he has begun to think that something serious is the matter, and that because recovery does not come it may never come.

The treatment of neurasthenia, with respect to the indications given by the mental elements, resolves itself into procedures suited to two general groups of indications. These may be broadly distinguished as the *first-effects* and the *after-effects* of the neurasthenic condition. Among the first-effects, or those attendant upon the active operation of the neurasthenic influences, are the direct and immediate results of excessive expenditure of energy, deficient repair, toxic effects, etc.; these may represent the formative stages of the supposed "molecular or chemical variation" that is manifested as "an exhausted or changed nutritional power." Among the after-effects these changed conditions become more pronounced; the expenditure of energy may be greatly lessened, but it is limited by its relation to weakened assimilation; the toxic elements may have been largely eliminated, though some of their effects remain; the condition is more strictly one of "irritable weakness," and all the secondary effects of morbid habit and association are in full force. The neurasthenic condition as modified by after-effects presents a materially different problem as to mental treatment.

In the early and active stage of neurasthenia, the problem is a relatively simple one for the analysis and interpretation of the mental symptoms as a guide to treatment. The his-

tory of the case should make it easy to distinguish the four orders of the subjective symptoms, and to trace their development. Take for example the case of the physician whose account of it was quoted, in a previous page, from his letter. At the closing of a busy year, while still doing very active work, he felt that it required greater effort; he could not help worrying unduly; there were threatenings of the sciatica to which he had been most subject at that time in the year, and he sometimes felt considerably fatigued. After three weeks of greatly lessened work, the four orders of symptoms were more plainly revealed; there was (1) "a letting down of spirits;" (2) lessened control over his worry; (3) the worry was consequently increased, and there was (4) an altered "sense of body," shown in nervous irritability and languor, and excessive sense of fatigue. The condition being further interpreted, there was more real "fatigue," but it was concealed by a fatigue-anæsthesia when he was still active, than later when he felt it more keenly after partial rest. In other words, he was really better when he felt worse, — he was recovering his sense of fatigue. This was proved by the sequel: in the fourth week, with no change in affairs, etc., and no treatment other than the comparative rest, he was quite well, was changed in appearance, had recovered his cheerfulness, and began his summer vacation with better zest than for a long time before.

In another case, a lady engaged in clerical work had for three months an increasing tendency to aching and a sense of pressure in the head, and to waking early in the morning; she would not confess to morning "tire," but said she felt "worse" then; she worried, felt the need of greater effort to begin her daily task, but "*could work faster*" than before, and being conscious of not feeling well, she expected a short vacation to restore her strength. On returning to duty, the work seemed very difficult and not half done on

the first day, and impossible the next, from weakened mental control; the insomnia, worry, etc., greatly increased, and a prolonged rest with careful treatment had to be ordered. She knew she was "running down," by failing appetite and loss of weight. Otherwise, there was little in either of these persons besides the subjective symptoms to call attention to the neurasthenic condition; neither was it appreciated by them until there was lessened stimulation by work to be done. The four orders of symptoms were plainly shown in the last case; their earlier recognition would have clearly guided treatment obviously necessary to have saved the patient from so dangerous an approach to a serious mental breakdown. This applies particularly to the fourth order of symptoms, — to the fatigue-anæsthesia, and the deceptive facility from irritable weakness, that enabled the patient to "work faster," thus increasing her danger. In the more advanced cases, the mental indications, as first effects, are clearer, and their analysis easier. Their value as guides to treatment is more readily apparent, pointing to their origin in organic inanition and auto-intoxication as the double cause of the "fatigue."

The after-effects of the neurasthenic condition present modifying indications that have to be met in the plan of treatment. These are seen in the later stages, either in convalescence or chronicity. The significance of the symptoms, in this regard, has been pointed out. For example, one who has regained some reserve of nervous energy, and maintains a fair degree of comfort when effort is kept within his limits of fatigue, may be prompted by desire, or a sense of duty, to over-exertion. The undue quickness of response to the stimulation of interest and attention is to be recognized as an evidence of the irritability of unstable weakness. The apparent ease and zest of the effort is not due to real power, but there is a speedy blunting of the sense of fatigue. The reaction of exhaustion and mental misery that come as after-

effects are not to be interpreted as the patient feels and thinks, but as precise manifestations of—(1) changed organic sensations shown in a lower emotional tone and "hopelessness,"—(2) the decrease of the mental power of control in weakened attention,—(3) worry, self-reproach, and apprehension as simply signs of a relapse of the "fatigue," the limits of which were exceeded in breaking the rule of treatment. The fundamental weakness is shown, from the beginning of the event, in (4) the susceptibility to stimulation and quickly changed sensations, followed by increased exhaustion and irritability.

Such an analysis of a later stage of neurasthenia reveals the four orders of symptoms as we may observe them in a case under proper treatment, in which there may be a measurably effective elimination, but defective assimilation still remaining, and therefore prolonged inanition. The irritable weakness is more characteristic, and the indications for treatment are all the more significant. The whole matter comes, in fine, to this:—the condition is one of deficiency of nervous energy,—the problem is to effect a re-storage of that energy. It is a part of the process that the power to do things can only be maintained or regained by the doing of them,—by the law of use and disuse. But the patient must always be "kept within the limits of fatigue" during treatment, through convalescence, to established recovery.

In these later conditions the advantage of intelligent co-operation on the part of the patient becomes more evident. It is a part of the treatment, therefore, that the patient should be taught to make a correct interpretation of his symptoms; he will thus become an aid to the physician, and learn finally to be his own guide as to the limitation of effort. One cannot "go by feeling" whose power to feel is itself disordered, and this lesson once learned has a therapeutic value by leading the patient to "go by judg-

ment." But it is precisely because of weakened attention and morbidly intensified feeling, that the better and often accepted judgment cannot be held. Here comes in one of the chief duties of the physician with respect to the patient's mental condition. It has been seen that his "exercise" must be followed and guided with persistent care. As the changes in bodily conditions are best revealed by the mental indications, these should be followed with sufficiently close observation, and encouraging counsel, to enable the patient to hold to the way of recovery and to faith in the necessary means. It is a part of the physician's business to repeatedly uplift his patient by explaining the newly arising worries, and directing as to diet and exercise. If he is left to himself too early in regard to all these matters, relapses are very sure to come through inability to interpret correctly the altered sensations and the fallacious appearances of returning strength.

The foregoing considerations apply particularly to the large class of patients that have to be systematically "held back" in all stages of the neurasthenic conditions. The opposite class of cases has been mentioned that require urging to effort, when the proper time comes. Here is revealed more plainly another modification, as an after-effect, that always introduces great difficulty into the treatment. It is the effect of the laws of use and disuse,—of practice, habit, and association. The long continuance of disordered activity has created a "functional disposition to repeat organic processes" in a morbid way, and it has been shown how this involves a like association of morbid ideas and feelings.

The "functional disposition" may work to good or bad results. In either case the principle is the same,—the law of use and practice rules. To overcome a harmful "disposition" to repeat organic and mental processes is exactly to re-acquire good habits by the practice of them. Hence it is

that the power to do things comes by doing them, and by gradually gaining the effects of practice. Small beginnings are necessary in these cases of neurasthenia. It is the persistence of repetition that is efficient. In the condition of first-effects there is lack of power, and it is plain that there is no place for heroic methods of breaking up morbid "dispositions" and habits. More harm than good is likely to be done by dominating methods unless based upon a clear insight. But forceful measures may sometimes be wisely used; it is only when power is sufficiently restored that such measures are justifiable as against morbid habit in the "after-effects." Confidence gained, and the truth made plain, are the best helps. In the peculiar cases requiring it the best way is for the physician to suggest in advance the new effort to be made, "not now, but by and by," when the patient is going to be ready for it. He becomes familiar with the idea, and when the time comes the expected effort is successfully made. This is leading along by holding back; such patients are afraid of being "pushed," they have usually, in the earlier stages of the malady, made mistakes in "pushing" themselves or by having it done by others. The patient's mind should always be prepared in advance for changes. Much is gained by giving the confident expectation of recovery. This is one of the best remedies of all, and it can be truthfully applied because most cases of true neurasthenia should get well.

The rule has been laid down that "exercises should always be kept within the limits of fatigue," and we know that the guides to those limits are most obscure. It is equally the responsible task of the physician not to overdo his duty, in the cases that have to be held back, and in those that have to be urged to effort. It is precisely in the extreme cases of the latter class,—what Mitchell would call the "vampire" type,—that the greatest discretion must be used. Such patients are often the victims of morbid association-habit and

a self-indulging egoism; under the spur of a seemingly perverse interest, they will sometimes make unwonted and extraordinary effort. We must realize that this may be done without a concurrent sense of fatigue, which may come later in a real and most painful way. Then the patient has a new argument to sustain her self-deception that all effort is bad; and even the physician is sometimes put at fault if his heroic measures are not successful. There is need of sympathetic helpfulness even here.

We often ask ourselves, in all cases requiring enforced effort, what are the "limits of fatigue"? It is perhaps the clearest guide in such cases that "exercise" may be pressed with safety while the fatigue of it is *felt*, even sometimes to the degree of painful *tire*. To avoid "fatigue" is to keep within the limits of *pathological* fatigue, which gives due warning by the signs of fatigue-anæsthesia. This rule applies as well to the graver cases of neurasthenia presenting mental symptoms, when the progress upward toward recovery reaches the degree where normal fatigue is felt. In such cases, after the symptom has been left behind that technically differentiates melancholia, it is neurasthenia the rest of the way to health.

A change from the usual surroundings often does great good. The breaking up of painful associations, on the principle of "out of sight, out of mind," always holds good to some degree. Even homesickness is often salutary,—it is a natural and wholesome "worry" that works to advantage when it displaces a morbid worry. Dependence upon devoted and sometimes over-sympathetic relatives is likely to endanger the formation of degenerative habits in long and severe cases.¹

It has often been said that the very first requisite for successful treatment is to gain the confidence of the patient; this recognizes the leading importance of the mental element. It is a part of this requisite, however, that the

physician should first earn the confidence he seeks to gain. It is the *interest* the patient has in the means for cure that is the most helpful motive; and we have seen what control a feeling of interest has over the attention. But the patient's interest is very exactly measured by what he feels is the physician's interest. This means sympathy,—for that and such interest are one. The physician's sympathy must be genuine,—no one more quickly than such a patient detects a false tone in it. No one more readily sees the fitness of good explanations. But the way to true sympathy is plain,—it springs from knowledge. The physician should first know his case,—then all that is needful follows. No good physician, who acquaints himself with the marvellous simplicity that underlies and rules the elements of his patient's suffering, and thus sees the way to cure, but must be keenly alive to the worthiness of the most skilful efforts. The patient's interest will then take care of itself,—his attention is held through motive interest. In mental matters all this is strictly physiological, which Bucknill says is true of all that is meant by "moral treatment."

Conclusion.—The purpose of this study of neurasthenia is to contribute something in the search for the philosophy of its treatment. To make this philosophy practical, it must be drawn down to plain terms. We have seen that the central fundamental fact is nervous weakness, manifested primarily in two ways:—(1) by an exactly parallel weakness of mental inhibitory control through voluntary attention, and (2) by the central motive element of a lowered emotional tone, from a sense of ill-being. The first of these indications may be concealed, even from the patient himself, by intensified interest and increase of effort; the second he *feels* and soon betrays.

The complex accessory conditions of changes in the sensations,—irritability and hyperæsthesia, languor and anæsthesia, and their causes,—have been explained. These are

manifested a little later than the primary mental effects. The prime indices of the neurasthenic condition, therefore, are weakened mental control and a painfully intensified motive element. It is this central emotional tone, determining *interest*, that has the sway; this is our point of attack. There are two ways of approach to it: (1) through the body, restoring its strength and well-being,—mental comfort and control follow; (2) through attracted attention and suggested ideas we reach the emotional tone,—healthful feeling and interest attend upon wholesome ideas.

While the patient is in the condition of first-effects, as long as the causes of bodily ill-feeling persist, we can only palliate, or prevent increase of trouble,—only transient effects are produced by influencing the emotional tone in the second way. Here the chief aim is physical restoration; this being soon accomplished, all is well. We prescribe rest and urge nutrition; this means also elimination. But in the condition of after-effects, the problem is changed. The toxicity of true neurasthenia being removed, and that of special diatheses, as of uric acid, being controlled, we have to deal with inanition from cell inaction, and the effects of habit. The patient finds it easiest and most *interesting* to attend to the habitual association of morbid ideas and feelings. The body in repose is then comparatively comfortable, while there is only a weak tolerance of a little effort and toxicity; the way to the motive element for the stimulation of healthful *interest* is through ideas. But effort is painful, the will is weak, habit is strong. Hence we instruct our patient how to understand his contradictory symptoms; we introduce corrective factors into his mental equations, raise or reduce others to their true powers, and eliminate the constants of error. Then we prescribe exercise, urge practice within the limits of fatigue, and maintain elimination and nutrition. By physiological use, the will recovers its power, exercise promotes assimilation and elimination, and increased vigor; effort

becomes easy, wholesome interests revive, and the emotional tone is one of ease and comfort.

The maintenance of a sense of well-being, under reasonable effort of body and mind, is the sign of obedience to the rule that "exercise should always be kept within the limits of fatigue." Normal fatigue is simply wholesome *tire*,—then rest is welcome and is followed by immediate comfort. Pathological fatigue is attended by fatigue-anæsthesia, and this marks the beginning of danger. We find our natural safeguard against that danger in observing the mental effects that quickly manifest their close relation to normal fatigue and its toxic products. But we have seen that when wholesome *tire* passes over into pathological fatigue, there comes over-tire not only to the central and motor, but to the sensory, elements of the mechanism. The recognition of the mental effects of the changes in the "sense of body" is our constant guide to prophylaxis and treatment,—for both of these uses the golden rule is that exercise should always be kept within the limits of *pathological* fatigue. Fatigue-anæsthesia betrays us into its toils,—it is a danger-signal if we recognize its significance. It becomes conspicuous by the absence of normal fatigue when there is the presence of *other* signs,—the first of these are the mental effects of fatigue. This teaches us the precise and saving significance of all these mental signs.

In these considerations lies the proof of the proposition with which the discussion was begun:—neurasthenia, for a guide to its prophylaxis and treatment, makes itself known to us mainly through the significance of its mental symptoms.

NOTES.

Page 62, line 4, at the end of the sentence. Here is found the beginning of the sense of inadequacy of effort, especially the mental element of it, so strikingly characterized by Beard and Mitchell. The patient has a certain consciousness of inability to control his own mind in his wonted way, and the consequent sense of more mental effort being required becomes tantamount to a sense of lessened power or an increase of the resistance or difficulty to be overcome.

Page 77, near the top of the page. The second order of symptoms may be amended to read as follows:—

2. Decrease of the power of voluntary attention (reflex attention), and sometimes of memory; a sense of inadequacy of effort.

Page 81, at the end of the first paragraph. It will be said that there may be a condition of true melancholia without this fifth order of symptoms. Such a condition is one in which there is always reluctance, and often difficulty, in undertaking to make a differentiation between neurasthenia and melancholia; it is indeed the difficulty of drawing the line between sanity and insanity. If, then, without this fifth order, the morbid condition is admitted to be a true melancholia, we must regard it at the same time as an intensified neurasthenia with its four orders of symptoms. With the development of the fifth order,—which includes the suicidal impulse,—in the sequence often clinically observed, the diagnosis is then clearly established.

Page 81, at the end of the third paragraph. The fact that these two striking conditions are common to neurasthenia and melancholia goes to prove their etiological unity.

Page 101, at the end of the third paragraph. Seclusion is a therapeutic measure that has been strongly recommended, and it claims more than a mere mention here. Its special value, for its mental effects, along with absolute rest in bed, in proper cases, is seen in those of profound cerebral exhaustion in which mental stimulation of all kinds must be minimized. It has its value, in part, from its including a change of associations, as the effects of habit need to be overcome in such cases. The use of it is contraindicated, as absolute rest is, in the extreme cases of irritable weakness, and especially in those of more pronounced depression and weakened attention. In these cases it is sometimes of greater value to relieve agitation and restlessness, and to attract the attention outwardly from the persistent worrying. The rule is to give such patients as much seclusion, as well as rest, as can be borne without increasing the depression and irritability. After a time the good effects of both appear in increasing quietude. This applies alike to neurasthenia and melancholia.

✓ Leaves (E.)

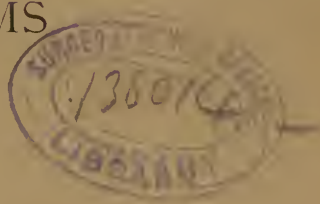
The Shattuck Lecture

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NEURASTHENIA

AND ITS

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